

SELECT FERNS

—
WILLIAMS.

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SELECT FERNS AND LYCOPODS.



CENTRE VIEW OF LARGE CONSERVATORY, VICTORIA NURSERY

Dimensions 100 ft. by 40 ft.

SELECT
FERNS AND LYCOPODS :
BRITISH AND EXOTIC.

COMPRISING DESCRIPTIONS OF
NINE HUNDRED CHOICE SPECIES AND VARIETIES,

ACCOMPANIED BY
DIRECTIONS FOR THEIR MANAGEMENT IN THE TROPICAL, TEMPERATE,
AND HARDY FERNERY ;

WITH
ILLUSTRATIONS.

BY
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ETC., ETC.

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PREFACE.

SINCE the publication of my "Hints on the Cultivation of Ferns," the taste for these plants has been rapidly acquired, not only by those of high estate, who possess ample means and space for maintaining an extensive collection, but also by those having no other accommodation than a Fern Case, or a small space in the open air. Most important additions have also been made to the number of kinds in cultivation, both by importations from foreign countries, and by the discovery of extraordinary and beautiful variations amongst our native species. These circumstances, together with the vast increase of cultivators of this family, has rendered my former work obsolete as a book of reference, and the present volume is the result of an attempt to supply its place.

The earliest mention of Ferns with which I am acquainted is that by the immortal Shakespeare, our nation's pride, but we have no means of ascertaining if our indigenous species were known to him in detail, though it is evident he was quite aware of the minuteness of the spores, and of the manner in which they were distributed, for in Henry IV., Gadshill exclaims, when being advised to take heed lest he should be caught, "We have the receipt of Fern seed, we walk invisible." This would almost lead us to infer that Ferns and their peculiarities

were taken notice of even in those days, or such a passage would not have been intelligible to a mixed audience.

In the following pages will be found brief descriptions of some six hundred and fifty exotic species, selected from those now grown, as being worthy of general cultivation; and in the portion of the book set apart for, and devoted to, our indigenous Ferns, about two hundred and fifty species and varieties are enumerated. The number of varieties could easily have been increased, as upwards of eighteen hundred named variations of the British species are recorded, but in a work of this size such a task would have been utterly impossible; the most distinct and handsome forms are, however, here given. Those desiring further, or more scientific, information respecting Ferns in general, are referred to the various works of Sir William Hooker, late Director of the Royal Botanic Gardens, Kew; Mr. J. Smith, Ex-Curator of the Royal Botanic Gardens, Kew; Mr. T. Moore, Curator of the Botanic Gardens, Chelsea; Dr. Mettenius, late Professor of Botany at Leipsic, &c., &c., men eminently distinguished for their extensive knowledge of plants in general, and Ferns in particular.

Horticulture is, undoubtedly, a great medium of civilisation, and its pursuit is highly commendable, for it is impossible for any one to study, even for a short period only, the structure, forms, and colours of plants, and benefits derived from the vegetable creation, without an elevation of thought, a refinement

of taste, and an increased love of nature ; and Ferns, with their elegant fronds, symmetry of form, and graceful habits, have in no slight degree contributed to the marked improvement of our national tastes.

I have endeavoured to make this work as plain as possible, presuming it may fall into the hands of many about to commence the study and culture of these charming plants, and I trust that the instructions given will be sufficiently intelligible to enable them to successfully prosecute their object, and at the same time prove instructive and useful to those farther advanced in Horticulture. To make it as interesting as possible, several Illustrations are introduced, from the accurate pencil of Mr. John Nugent Fitch, who has rendered the forms and habits of these plants most exquisitely. The view of the group of *Dicksonia antarctica*, laden with snow, is copied from a photograph taken on Mount Wellington, Tasmania, which has been kindly lent me for this work ; it shows the plants growing in and up the sides of a deep ravine or gully, and is both curious and suggestive, for if they can withstand snow storms in their native habitats, we may reasonably hope to have them grow in the open air in many parts of these islands, if a sheltered and properly prepared spot is selected for their reception.

And whilst addressing those who may be already in possession of a Fern House, or who may be about to erect houses for their cultivation, I have not been unmindful of those who, though destitute of the above advantages, may yet be enthusiastic lovers

and growers of these elegant and graceful plants. To assist such, a chapter is devoted to the mode of cultivation in Wardian Cases, in Fern Shades, and in the open air, and lists are added of the species adapted for these special purposes; while for the information of those who wish to add variation of foliage to their hardy Ferneries, a list is given of such exotic species as will withstand unprotected the rigour of our winters.

As many aquatic plants are objects of great beauty, and add materially to the interest of a collection of Ferns, the names of a few kinds suitable for the tropical, temperate, and hardy Fernery are introduced. Ferns being also admirably adapted for the decoration of the dinner table, a few remarks upon this subject will be found, together with instructions for their use, both in a living and dried state, and an illustration of one of the prettiest stands for this purpose that could be selected.

In conclusion, should any of those who engage in the culture of Ferns be enabled, through the perusal of these pages, to increase their knowledge by the instructions here given, or to add to their pleasures, by the restored health or increased vigour of their favourites, my object in penning them will be fully realised, and I shall have, though perhaps in a small degree only, contributed something towards the happiness and advancement of my fellow creatures.

B. S. WILLIAMS.

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UPPER HOLLOWAY, LONDON.

EXOTIC FERNS.

INTRODUCTORY REMARKS.

FERNS have become very great favourites during the last few years, and they are becoming more so every year. Neither can we wonder at this, for they certainly are amongst the most elegant and graceful of Nature's productions. Perhaps they claim our notice the more, because, unlike Orchids and many other plants, they are not exclusively the luxuries of the wealthy, but can be enjoyed by all who have the taste for them, inasmuch as many kinds may be cultivated by those who have no plant houses or garden whatever.

Although we have but few species in our own islands, yet the manner in which they have sported or taken on new forms is marvellous; and as these forms have become persistent, they have added considerably to our British Fern Catalogues, and enabled us to make a far more varied display in our hardy Ferneries. But some parts of the tropics abound in Ferns—for instance, on the Organ Mountains in Brazil, and on the slopes of the Andes

they luxuriate, being found growing there at great elevations. In Peru, one of our botanical travellers, "Dr. Spruce, found nearly two hundred and fifty species within a diameter of fifty miles, and many of these Tree Ferns." The West Indies are also very rich in Ferns, three hundred and forty being described from the British islands alone. Chili is also a great Fern country, upwards of one hundred and sixty species having been described as coming from it and the Island of Juan Fernandez, very few of which are at present in cultivation. The Fijis also abound in them, and many beautiful forms growing there will one day, I hope, charm our eyes in this country.

In the "Enumeration of the Ferns of Java," upwards of four hundred and fifty are described as existing in that island alone. Borneo, Sumatra, Malacca, and the Philippine Islands abound with them, as well as the whole of the East Indies; and very few, comparatively, from the latter country are in cultivation, though many are peculiarly beautiful and interesting. In Mexico, great numbers exist, some three hundred species having been described, which are not in cultivation. In Western Africa, great quantities of Ferns are found, and many of them species that are peculiar to that country. At Fernando Po, some considerable distance up the mountains, a splendid *Cyathea* is found, forming groves, and reaching upwards of thirty feet in height. It is a fine species, and the crown, rachis, and stipites are densely covered with large black chaffy scales. Again, if we come round to the Cape, in South Africa, a quantity of Ferns exist there that have never yet been introduced to our gardens, and no doubt many new species on that continent still remain unknown to science. So also in many other places where the atmosphere is sufficiently humid, they are to be found, from

the humble species of an inch in length, to the noble arborescent kinds, rearing aloft their splendid crowns of fronds, on stems from ten to forty feet high, beautifying the landscape, and forming objects of individual grace and elegance which we are only now just beginning to realise for ourselves. Until recently, we have known them by the descriptions of travellers only; but now, quantities of these large stems have been introduced to this country, especially of the Australian and New Zealand kinds, and magnificent specimens make their appearance at our horticultural exhibitions, great encouragement having been held out by the different societies for their production, which speaks well for horticulture, proving that it is steadily but surely developing a superior and refined taste amongst the community at large.

At the great International Exhibition of 1866, Tree Ferns were the great feature of the place, winning admiration for themselves, and imparting additional beauty to the flowering plants with which they were surrounded. No other plants could have produced an effect like those noble *Cyatheas* (*C. medullaris*) from the Crystal Palace, as they stood rearing their magnificent heads above the gorgeous collections of Azaleas, Roses, &c., exhibited there; indeed, had we had no Tree Ferns, the Exhibition would have lacked half its beauty and attraction; no other plants that we have in cultivation could have been substituted. Not only did they decorate this place with graceful beauty, but, looking at them in the Crystal Palace, standing over some of the large tanks of water, they were the most attractive ornaments of the place, though, with all their magnificence, they have come to a premature end; for I believe they were destroyed last year by fire, when so many trea-

tures were lost by the destruction of the tropical end of the building.

For decorative purposes, Ferns stand unrivalled, their graceful and delicate fronds causing them to be appreciated by all persons of taste. Whether wanted for the embellishment of the conservatory or stove, for the dinner table, or the head-dress of a ball-room belle, for bridal bouquets, or the simple decoration of a sitting-room, Ferns present a beauty of outline which is never tiring to the eye. Looking at them from a strictly horticultural point of view, they are grand plants for the decoration of large conservatories or winter gardens, the Tree Ferns mixing admirably with such plants as *Dracæna australis* and *lineata*, *Cordyline indivisa*, *Chamærops humilis*, *Seaforthia elegans*, *Areca supida* and *A. Baucris*, *Araucaria excelsa*, *Phormium tenax variegatum*, *Dasyllirions*, *Yuccas*, and *Agaves*; and there are many other splendid ornamental plants, with which they associate well. Both the tall and dwarf-growing kinds may be used for this purpose, or for mixing with flowering plants; to either they lend a charm no other plants can supply.

A great mistake is often made by Fern growers—keeping them in a temperature higher than they require. A little practice and forethought will soon obviate this. First, the native country of a particular Fern must be learnt, and then the part of the country in which it is found growing. If at a great elevation, even in a tropical country, it will require cool treatment, and if low down in a similar latitude, then a stove temperature. Thus, *Asplenium alternans* is a native of the East Indies, but if you give it stove treatment it will soon lose all its vigour and turn white, and if examined you will find it smothered with thrips and scale, because the house is

too hot; for being found high up in the hills in its native country, it requires only temperate treatment. The same thing occurs with any temperate Ferns if put into tropical heat, but only give them the proper treatment, and success will follow. What that treatment is, I am endeavouring to make plain in these pages.

As Ferns affect shady places, those cultivators who take an interest in gardening can scarcely spend a little time more pleasantly, on a summer's day in our own country, than in visiting these beautiful plants in their cool retreats, particularly when they grow near the margin of a stream whose banks are furnished with rustic seats, on which the visitors may sit and admire the noble outline and elegant fronds of some of the larger species, with their exquisite verdure half covering the rocks, or bending gracefully over the water.

Of the economic qualities of Ferns I can say little. The pith of *Cyathea medullaris* is eaten by the New Zealanders, and the stems of *Pteris esculenta* and *Callipteris esculenta*, as well as the tuberous roots of *Nephrolepis tuberosa*, have been used for food, but, generally, when nothing better was to be obtained. *Lastrea Filix-mas*, *Ceterach officinarum*, and *Scolopendrium vulgare*, &c., have been used medicinally; but with the exception of the first, they are not in much repute. The styptic drugs brought from Sumatra under the barbarous names of *Penghawa Djambi*, and *Pakoe Kidang*, are supposed to be the produce of Ferns. A species of *Cibotium*, which is very common in the Sandwich Islands, has had its stipes stripped of the long dense hairs with which they were clothed, and carried away to California and Australia, for the purpose of stuffing cushions and beds; but, I believe, after being in use a short time, these

hairs wear down to a fine powder, and that the trade has consequently collapsed. Ferns have played an important part in the world's history, their remains in the coal formation proving that vast quantities existed at some early period; while the impressions left behind of their fronds, show that they were similar in form to those we have now on the earth's surface.

CULTIVATION IN POTS.

THE most suitable place for growing the several kinds of tropical Ferns and Lycopods is a stove, orchid house, or similar structure, in which the atmosphere is kept very generally moist, and in which the temperature ranges from 50° to 60° in winter, and from 70° to 80° in summer, when, by the addition of sun heat, it may rise to 85° or 90° . This degree of heat will not injure the plants, provided they are shaded from the direct rays of the sun. I have grown them in an orchid house, placed in different parts among the orchids, or beneath those which are suspended in baskets from the roofs; and, in this latter position, many of the kinds thrive remarkably well, their growth is rapid, and the fronds are all finely formed and beautifully coloured. They will even grow when placed on the floor of the house, and are but rarely injured by the water that falls from the tables or baskets above them. I am of opinion that, if kept clean, the practice of growing Ferns underneath the orchids, besides proving a means of concealing, to a great extent, the unsightly appearance of the pots,

and adding to the amount of verdure and consequent beauty of the house, is a benefit to both kinds of plants. The drip from the orchids above, and the damp or steam arising from the Ferns beneath, keep up the moisture longer than when they are watered separately. My practice is to syringe the plants once a day (during the afternoon) in the months of May, June, July, and August. In speaking of syringing, I must be understood to mean the majority of Ferns. I do not syringe them indiscriminately, for there are several kinds that will not long remain in a healthy condition if subjected to this treatment—such, for example, as the genera *Gymnogramma*, *Nothochlæna*, *Cheilanthes*, *Hymenodium*, *Mohria*, &c. Watering, at all seasons, will require to be regulated in some measure by the state of the weather. When this is dull or wet, less water will be needed than when it is hot or dry. I shut up the house in the spring of the year about three o'clock, but in May, June, July, August, and September an hour later, and I then give the plants a slight syringing with water of about the same temperature as the house.

Ferns require, especially during their growing season, a good supply of water at their roots, which should never be allowed to get dry, as this would most likely kill the plants, or, if not, cause the fronds to shrivel, and destroy their vigour and beauty. I believe there are few persons now so antiquated in their ideas, as to persist in drying off their Ferns in winter, yet such has been the ease in former times; but the only result obtained by that treatment has been, in some cases, the death of many of the more delicate kinds, and in others, the loss of many fronds, to the great detriment of the plants—a loss which is not compensated for until they make the next

summer's growth. My practice is, even with the deciduous species, to keep the soil moist when at rest. Such treatment I have found ensure success; and if we look at the kinds we have growing in our own country, we find they are moister at the root in winter than in summer. Though the soil in which Ferns are grown should always be kept damp, great attention should be given to the state of the drainage, that there be no lodgment of any stagnant moisture about the roots or crown of the plant; and the atmosphere of the house should be partially dried once a day, by means of ventilation. But, in doing this, care must be taken to prevent currents of cold sharp air coming directly upon any plants which are growing in a warm moist atmosphere, as their young and peculiarly tender fronds would thereby be greatly injured, if not destroyed. Ventilators should, if practicable, be made near or below the hot-water pipes, that the air may be warmed to some degree as it enters the house.

There are no special houses needed for the cultivation of Ferns: any house that has the heat, air, and moisture properly balanced in it, will perfectly suit them. The houses I have here are span-roofed, ten or eleven feet high, forty-five feet long, and eighteen wide. A table extends down the centre for the large-growing kinds, and the side tables are devoted to the smaller species. The floor is cement, which, after a long trial, I find better than any other material I have seen: it affords no harbour for insects, and can be easily washed down and kept clean, cleanliness being one of the chief points to be studied in the cultivation not only of these particular plants, but plants of all kinds. I do not intend houses of this size and description for Tree Ferns; they will require some-

thing larger, for when the stems reach four or five feet in height, they have large spreading heads—indeed, some of the species, with only one foot of stem, will make fronds six feet long. But I shall devote a chapter entirely to their culture and treatment, and therefore need take no further notice of them here.

To have a general collection of these plants in good health, two houses are required, one for the exotic species from hot regions, and the other for those that are natives of the temperate regions, whether of hot or of cooler countries; for though many of our East Indian plants require as much heat as we can give them, there are some that withstand the rigour of our winters unprotected and yet unscathed.

I should use a temperate house for all such Ferns as the Mexican species of *Nothochlæna* and *Cheilanthes*; for the New Zealand, Australian, and Tasmanian species; for many of the Cape of Good Hope, and several of the East Indian species which are from the hill countries; for all the species from Madeira, Teneriffe, North Africa, and central Europe; and for those from China and Japan. The temperature I have found to answer admirably for the cool species is from about 40° to 45° during winter. In summer no fire is necessary; and if the house has a northern aspect, it will materially assist in keeping a regular, cool, moist atmosphere, which these plants so much delight in. Many species, again, from the countries named above, are hardy, and those that are not quite so, are sufficiently firm in texture to stand out of doors in the summer, in shady places, forming objects of great beauty, and contrasting very agreeably with the gay flowering plants. Mr. Gibson, at Battersca Park, as usual, is quite alive to this sort of thing, and had, last

summer, some very beautiful spots in his sub-tropical garden, which would amply repay a journey from the most distant part of the country to see. I trust he will continue to experimentalize, and show us all how to use, and what to use, for this purpose, and thus lead the public to a just appreciation of the diversity of foliage, as well as flower, in the decoration of our gardens. Many of the Tree Ferns grown in a cool house in pots make splendid objects when stood out of doors in the summer. The Australian Bird's Nest Fern, also, makes a noble plant for vases, always bearing in mind that they must be stood in places sheltered from the direct rays of the sun, and be returned to the house again in autumn before the frost sets in—though even that may not affect many of them so much as we think, for *Dicksonia antarctica* (which is admirably shown in the Illustration) is frequently loaded with snow in its native habitat. We may, I think, by a little experimentalizing, greatly enlarge the number of hardy exotic species.

SOIL AND MODE OF POTTING.

THE time I like best to perform the operation of repotting, or, as it is usually called, shifting, is about the beginning of February. This I mean as a general rule; for, though none will require repotting through the winter, yet if the amateur is desirous of producing as fine and large specimens as possible, many will require several repottings before the autumn sets in, the number and size of each shift being of course entirely at the option of the grower; but the time for the general

potting of the collection should be in the early part of the month of February, before the sun attains much power, and before many new fronds have begun to unfold. They will, from this time forward, go on growing, and the roots will have established themselves in the new soil and be enabled to supply nourishment to the fronds when they develop themselves; whereas, if left until the middle of March, when many fronds are half grown, they droop from want of that sustenance which the roots cannot supply because they have been so recently disturbed; and, in addition to this, the fronds in this state may be entirely destroyed if a sudden gleam of the hot March sun rests upon them for a short time.

The soil required for all Ferns is somewhat similar; still, many slight deviations from any general rule must be made. Those requiring any peculiar management will be treated in detail in the remarks preceding the genus, and by that means they may be spoken of here generally. In doing so it is necessary to divide them into two sections, firstly, those which grow erect; and, secondly, those with creeping rhizomes. The first I have found to succeed well in a mixture of loam, peat, and silver sand, in the proportion of one part sand to two of the others. This compost I recommend for those with limited house-room, as the plants, though assuming their normal condition, producing fertile and barren fronds in great beauty, do not attain the same height and size as when potted in a mixture of two parts fibrous peat, a small portion of light loam and good leaf mould, and one part silver sand; in this they grow very luxuriantly, often much larger under cultivation than in their natural habitats. It must be remembered, however, they require

more frequent waterings when in this, than when potted in the first-named mixture.

Having prepared the soil by well mixing, and breaking it up into pieces suitable in size for the pots to be used, the next requirement is the pots ; and here, the first and great thing to be attended to is the drainage. I like good drainage for Ferns, but not too great a quantity ; and, if proper care be taken, this can be obtained with half the quantity of potsherds frequently used. They should be placed with the hollow side downwards, and of two or three sizes, the largest at the bottom, and smallest on the top, the whole covered with a thin layer of sphagnum moss or rough peat. The plant to be operated upon must now be taken carefully out of its old pot, the drainage and some of the material removed. All old dead or decaying roots should be cut away with a sharp knife, and as much of the old soil shaken off as can be done without injury to the plant. Then place in the pot some of the new soil, on to which the plant must be carefully put, proper regard being taken as to the depth. Some amateurs pot their plants on a level with the rim or edge, whilst others leave a fourth or more empty ; my practice is to leave about an inch in pots of four inches in diameter, and more or less in pots under or above this measurement, to allow of sufficient water being given at one time.

Some of the species having creeping rhizomes are peculiarly adapted for Baskets or forming pyramids, as many of them grow naturally on trees and in crevices of rocks. They may be kept to any size required, as they are so easily divided. Thus, many kinds of *Polypodium*, *Davallia*, and others, if fair-sized plants, may be cut through into three or four without sustaining injury.



A GROUP OF DICKSONIA ANTARCTICA.

From a Photograph taken on Mount Wellington, Tasmania, after a Snow Storm.

I have found these succeed best in lighter soil, such as good leaf mould and fibrous peat. To make a pyramid, in which way many of the species of *Phymatodes*, *Pleopeltis*, &c., have more room to creep about, and form fine objects, I use fibrous peat only, and in large pieces, building it up above the level of the pot, according to the size of specimen required, or the vigour of the species to be placed upon it. The rhizomes will, in the first place, require pegging to the peat, but after a short time they root into it and bind all into a firm mass.

After the plants are repotted and placed in their proper positions water must be given sparingly and carefully. By sparingly, I mean not commencing to use the syringe overhead so freely, nor to make applications of water on the stages and floor so frequently, as will be requisite later in the season; and by carefully, I mean to just give sufficient water to wet the whole of the soil through, whenever it shows indications of dryness. If water is administered in too large quantities, at this period, the new soil becomes soured before the roots are in readiness to use it. Air must also be admitted with caution at first, for if not, the hot drying winds we often experience in March, may cause some of the young delicate growths to shrivel up. I think little more need be said here: practice will soon enable the lover of these plants to understand their peculiar wants and requirements.

TREE FERNS.

THESE are features of quite recent introduction to our gardens generally. Formerly they were only to be found at Kew, under the fostering care of Mr. J. Smith, the

ex-Curator, and author of several scientific works on these plants, and at a few other Botanic Gardens. Now, however, they are deservedly becoming very fashionable, and are a leading feature at our horticultural exhibitions and fêtes, banquets, and public dinners. In former years, at the making out of the Schedules for the London exhibitions, Ferns were passed over with contempt; and if means had not been used by such men as Mr. Thomas Moore, Curator of the Botanic Gardens, Chelsea, one of our greatest authorities on Ferns generally, and one who has been using all his influence to bring these beautiful objects before the public for a long time, they probably might still have been passed over. Such means have at last brought about an improvement in our tastes, and we now hear the beauties of these plants extolled by every one; while prizes are offered for their production, and the Societies holding out these inducements are liberally and quickly responded to, as the exhibitions at Kensington and Manchester, in 1866 and 1867, fully proved. Indeed, without such plants, no fête can be successful; for gay and brilliant colours alone will not satisfy the eyes of the horticultural public. The same happy change has come about in respect to floral exhibitions as has occurred in the decoration of our gardens at home, both in-doors and out, the rule being that flowering plants must have mixed with them a certain amount of ornamental foliage, or the effect is not pleasing to the eye. Some, indeed, assert that a conservatory, properly arranged, with ornamental foliage plants and Ferns alone, is the most effective.

Tree Ferns are found in many parts of the world, but are most commonly met with in tropical countries. Thus, in South America and the West Indies, in India and the Eastern Archipelago, they are numerous, while in more

temperate regions — Australia, Tasmania, and New Zealand, are their chief resorts. They grow from three feet to sixty feet high, or even more, varying in size from that of an ordinary walking stick, to four or five feet in circumference. As they have an extensive range, it will be easily understood that some are subjects for the cool house and others for the stove. They all require about the same soil and treatment, varying only as to temperature. My object in giving a chapter to them separately is, that many growers are now putting up houses specially for these arborescent kinds, and, as they are brought home in large quantities, most of the species can be purchased at a comparatively moderate cost. Some continue rare on account of the difficulties attending their introduction: for instance, *Alsophila Leichardtiana*, a tall-growing but slender-stemmed species from New South Wales, mostly arrives in this country dead, from the reason of its small and wiry crown having all the vitality dried out of it before reaching us; and *Cyathea medullaris*, though more plentiful, frequently arrives in England with its crowns soft and dead, from the great quantity of pulpy matter existing in the heart becoming decomposed. I have frequently had boxes arrive containing various species, and all dead; again, at other times, I have been equally fortunate in receiving them all alive. I have no doubt much depends upon the time of year in which they are sent from their native places. The best time is soon after they have matured their growth, and have become dormant. Supposing a box of these stems to have arrived with firm crowns, and in good order, the first thing to be done is to prepare some soil; for, though treated very badly before packing, by being deprived of all their bot-

tom roots, some new ones will soon make their appearance. The best mixture for them is good fibrous peat and turfy loam, in about equal parts, with an addition of some silver or river sand. The pots should be proportionate in size to the height of the plant, well drained, and the stem must be put sufficiently low in the pot, for the soil when filled round it to hold it fast. After the operation of potting is finished, a little heat should be applied to the place they are in, but, for the first week, water should not be given. After this time they may be sprinkled over the stems, but no water should be allowed to remain in the crown. As roots and fronds begin to start, more water, and a higher temperature, may be given; and, if all goes on well with them, they will soon be a mass of roots, when they must be liberally supplied with water, by sprinkling with the syringe, and the sun must be kept from these, as recommended for Ferns in general. These remarks apply to the temperate as well as tropical kinds. I always like to start the former into growth with a gentle heat, when first imported. When thoroughly established, the temperature should be gradually lowered, until it reaches that of the house they are destined to occupy, as, by this means, no check or injury can happen to them from removal.

The species from Australia, Tasmania, and New Zealand make beautiful objects for the decoration of cool houses. I have many in the conservatory here from ten to eighteen feet in height of stem, and, mixed as they are with a general collection of other ornamental foliage and flowering plants, the effect is beautiful. When placed in pairs down the centre of a house, and set sufficiently wide apart to allow shorter plants to stand between them, alternating with pairs of such plants as *Dracenas*, and so

that their fronds just meet over the pathway, thus forming an avenue, they have a stately and grand effect. If a structure is erected for their special culture, they present a wonderful sight. To economise glass, I would have the bottom of such a house three or four feet below the ground level, accessible by flights of steps; the bottom should be well drained, and the trees either planted out in places prepared for them, or plunged to the level of the rims of the pots. Winding walks can be laid out round and between them; the floor can be planted with small-growing Ferns and *Selaginellas*, and many species of *Hymenophyllum* and *Trichomanes* will thrive admirably on the stems of the arborescent species, the whole forming a grove of enchanting beauty. Another thing, however, is wanting to make such a spot perfect. Grand as such a scene is, and however much pleasure one derives from admiring them from beneath, to be fully appreciated they must also be seen from above; and in a structure of this kind, a gallery, either constructed of stone, forming a rugged and natural-looking ascent, which may have all its crevices planted with Ferns, or a light iron structure, should be erected for the purpose. From this point of view the appearance of these noble plants is so totally different from what is seen of them from below, that if never seen, it can scarcely be conceived.

These remarks will apply to either stove or greenhouse kinds, saving the temperature; but, on account of the tropical species requiring artificial heat, they have not at present become so generally cultivated, though I believe the day is not far distant when that trifling disadvantage will not be studied, and collections of Tree Ferns from all countries will be in great demand.

The annexed illustration of *Dicksonia antarctica* is taken

from a photograph kindly lent me for this occasion. It was taken on Mount Wellington, Tasmania, and shows the peculiar manner in which the plants grow, and that they are sufficiently hardy to withstand a severe snow storm. Some of the trees represented are upwards of twenty feet in height.

The following species will be found in alphabetical order in the descriptive part of the book; but I have given a list of Tree Ferns here, that the temperate and tropical kinds may be more readily distinguished, and the temperature each section requires:—

TEMPERATE SPECIES.

SUMMER, 68° to 75°. WINTER, 40° to 45°.

Alsophila

- *australis*, South Australia
- *capensis*, South Africa
- *Coopori*, Queensland
- *excelsa*, Norfolk Island
- *Leichardtiana*, N. South Wales

Balantium

- *Culcita*, Madeira

Cibotium

- *Barometz*, China
- *Menziesii*, Sandwich Islands
- *regale*, Mexico
- *Schiedei*, Mexico

Cyathea dealbata, New Zealand

- *medullaris*, Pacific Islands and New Zealand

- *princeps*, Mexico
- *Smithii*, New Zealand

Dicksonia

- *arboroscens*, St. Helena
- *antarctica*, Australia
- *fibrosa*, New Zealand
- *lanata*, New Zealand
- *squarrosa*, New Zealand
- *Youngiae*, New South Wales

Thyrsopteris

- *elegans*, Juan Fernandez

TROPICAL SPECIES.

SUMMER, 70° to 80°. WINTER, 60° to 70°.

Alsophila

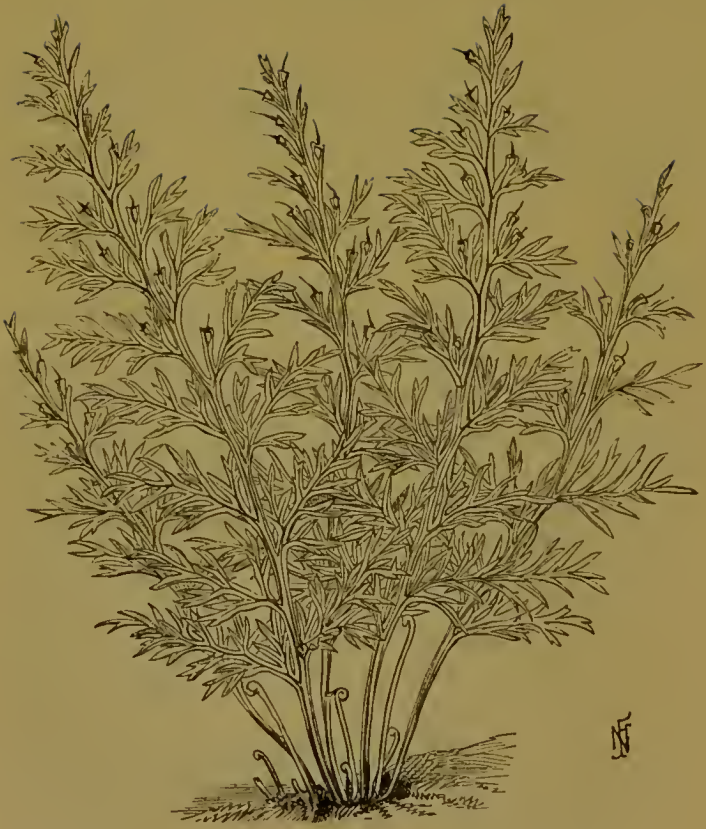
- *aculoata*, West Indies
- *armata*, Tropical America
- *aspera*, Tropical America
- *Beyrichiana*, Brazil
- *gigantea*, East Indies
- *glauca*, Malay Islands
- *procera*, Brazil
- *pruinata*, West Indies
- *radens*, Brazil
- *Tænitis*, Brazil

Cyathea

- *arborea*, West Indies
- *canaliculata*, Mauritius
- *excelsa*, Mauritius
- *Imrayana*, West Indies
- *serra*, West Indies
- *sinuata*, Ceylon

Homitelia

- *grandifolia*, West Indies
- *horrida*, West Indies
- *Karstoniana*, Venezuela
- *speciosa*, Tropical America.



TRICHOMANES ANGUSTATUM. *Carm.*

West Indies, &c.

FILMY FERNS.

The genera *Hymenophyllum*, *Trichomanes*, *Feea*, &c., constitute what are popularly called Filmy Ferns. They are very nearly allied to each other, and, indeed, it is very questionable if any real and permanent distinction can be made. The species comprising the two families have a wide range, being discovered in almost all parts of the globe; but the great majority are found on islands where the atmosphere is naturally moist and humid, and when found on the Mainland, it is only where such an atmosphere exists, great moisture and shade being absolutely necessary to their existence, for the delicate fronds are so membranaceous in nearly all the species, that if subjected to drought or exposed to the sun for only a short time, they become completely shrivelled. Up to the present time New Zealand, Tasmania, and the West Indies have furnished us with most of the species in cultivation. We have also some few from Chili and the East Indian and Pacific Islands, but not many, and they are among the rarest in collections; yet many beautiful forms exist in those islands which we hope soon to see brought to this country in a living state, to give additional grace to our Ferneries.

The species which will be found recorded in the descriptive list as natives of the East and West Indies we have found succeed best in a temperature ranging from 50° to 75°, and those from Chili and New Zealand in about from 40° to 65°. It must also be borne in mind, they all require to be kept in a closer atmosphere than other larger-growing Ferns, yet air must not be totally excluded, but care should be taken, when ad-

mitting fresh air to the plants, that it is not sufficiently dry to absorb the moisture from them.

The New Zealand species are admirably adapted for Glass Shades and Wardian Cases, to be grown in the dwelling-house, where they serve to enliven with their modest beauty and elegance the otherwise dull winter months. Many species grow best upon logs of wood or on Tree Ferns, and others succeed in a mixture of fibrous peat, sphagnum moss, and lumps of sandstone. They must have ample drainage, for, though requiring an abundance of water, it must not be allowed to stagnate about them.

I have seen in several places small houses specially set apart for the cultivation of these gems of the Fern tribe, and also glass partitions or large Cases made in ordinary stoves for these plants, and many good collections of them are grown in such places. If a house is to be erected specially for their culture, a shady spot should be selected, and it should have no glass at the sides, but the walls should be built high, a glass roof only being needed—indeed, a natural ravine, with a roof on the top, is the finest place that can be selected for a Fernery of any description. For the Filmy Ferns, as I have before said, a very humid atmosphere is requisite: if this is not regularly maintained, success cannot be achieved. The Messrs. Baekhouse, at York, have a house set apart for *Trichomanes*, *Hymenophyllums*, and *Todeas*. It is approached by steps, and has glass at the roof only. The interior is fitted up with rock-work, and the plants evidently have all their wants supplied by the luxuriant manner in which they are growing. At the Botanic Gardens, Glasgow, Mr. Clark, the Curator, has a small house filled with our two British *Hymeno-*

phyllums, in company with the Killarney Fern. They are growing upon stone and wood, and the house is fitted with pipes so arranged that a shower of water can be thrown upon them, which falls almost as light as dew. But let not the lovers of these plants imagine they cannot be grown without a house specially set apart for them. Any one possessing even a small greenhouse can grow many of the temperate kinds, by introducing a common hand-glass or a frame, which for convenience might be placed under the stage, and those that have no glass house of any description can grow them as I before mentioned in Wardian Cases. I saw a splendid example of this at the Dundee Horticultural Exhibition in 1867. It was a Case about three feet long, with the centre tastefully arranged with rock-work to some height, and these Ferns planted on it, the whole having a charming appearance, deservedly meriting the praise of every beholder. They will also grow under bell-glasses.

A FERNERY UNDER GLASS.

THE cheapness of glass having rendered structures of this material much more common for gardening purposes than formerly, many kinds of plants, that have always had many admirers, have been more extensively cultivated. This has been very much the case with Exotic Ferns. They already occupied a place in many of our vineries, stoves, and Orchid houses, and in some of them filled up a considerable part of the space. Now, however, a collection of tropical Ferns, under

glass, is seen quite as frequently as an out-door one, consisting of hardy species only.

I have been agreeably surprised, and much pleased, at many places I have visited, to see the growing taste for houses specially for the cultivation of these plants; and many a fine Fernery has been made of a house comparatively useless for other purposes, Ferns being very accommodating, and growing in many places under glass where no other plants will thrive, because they are shade-loving plants, and do not, like our exotic flowering plants, require their growth to be exposed to the sun. Such treatment—that is exposure—would be the death of most Ferns, while the other plants would produce no flowers if not subjected to its influence. A Fernery devoted to the cultivation of the temperate species of Ferns is a most delightful retreat in summer; for then these kinds require no artificial heat; so that, to have tropical and temperate species alike in good health, two houses are necessary.

In erecting a structure for the culture of these plants, it is requisite to have a perfect knowledge of the kinds intended to fill it, so that no mistakes may arise through want of space, for nothing causes so much disappointment as, after a few years, to find the house too small, when it might have been made the proper size at the time of its erection, at almost the same expense. A span-roofed house of good dimensions, the sides facing east and west, would be the most suitable. The interior should be laid out with winding walks, and the whole surface undulating, with rock-work disposed in a natural manner, to give it the appearance of a beautiful Fern-clad ravine, making every accommodation for the plants. This point must be ever before the eyes of a person intending to have

a Fernery. I have often thought, on looking at some of these houses, that the object has been to make a rockery and not a Fernery. This is to be avoided. If possible, water should be introduced, as it never fails to give a pleasing effect when it is brought into the house in the form of a cascade, splashing and tumbling over and among the rocks, and at last forming a small lake, in which may be grown many beautiful aquatic plants (a list of some of the most suitable for this purpose will be found at the end of this chapter), which will give a contrast in foliage, and bring much additional pleasure to the possessor. In this the *Ceratopteris thalictroides* and *Acrostichum aureum* will grow luxuriantly, being Ferns that naturally inhabit swamps.

Some Ferneries never give satisfaction to their owners, and, if constructed on wrong principles, they never can, for if too much stone, and metal, are introduced in the formation of the building, it will produce a harsh atmosphere, quite uncongenial to the growth of this, or, indeed, any other class of plants. Under such circumstances success must not be looked for; but in a well-constructed house the atmosphere will be properly balanced, the rocks and stones will be covered with seedlings, the larger kinds will thrive, and the whole will present a most charming picture. I cannot refer to a finer or more striking example in illustration of this than the houses I have seen at Manly Hall, Manchester, the seat of S. Mendel, Esq. There are two Ferneries in that place—a tropical and a temperate, the former being seventy feet in length, twenty-six feet in breadth, and seventeen feet high, and the latter ninety-six feet in length, twenty-four feet in breadth, and sixteen feet high; they are situated at some distance from the mansion, and to arrive at them

a beautiful portion of the pleasure grounds has to be traversed.

Upon entering the tropical house, such a display of enehanting fairy-like scenery suddenly meets the sight, that a few moments' pause is absolutely necessary to understand the transformation. Commeneing to look at the place in detail, one becomes more enraptured at the taste and skill displayed in the arrangement of the rock-work. Here a great boulder is jutting out, there another, covered with *Selaginella*, and these cause the walk to wind round about them, and down into a valley with a small lake, in which are many choice aquatics, the fine pendulous tufts of grass-like foliage of the Egyptian paper reed (*Papyrus antiquorum*) making a beautiful contrast, with such plants as *Dracæna terminalis*, *grandis*, and *Cooperi*, various *Marantas*, many Ferns, both arborescent and dwarf-growing species, *Cyanophyllum magnificum*, *Alocasias*, a stately *Theophrasta imperialis*, and many other plants with fine foliage and flower which surround it. The crevices of the rocks are planted with vast quantities of dwarf Ferns, and *Selaginellas* luxuriate in every possible place, whilst peeping out from amongst them here and there are such plants as *Goodyera pubescens*, and *discolor*, *Cephalotus follicularis*, some handsome-leaved *Eranthemums*, and many other little gems, which are thriving splendidly.

Passing out into a Fern-elad recess, and crossing some water by a rustic bridge, you are in the temperate house. Here, also, Ferns are growing with the greatest luxuriance, the walk winding round masses of stone arranged in a perfectly natural manner, over and amongst which the water splashes and tumbles like a mountain rill. You descend into a valley, and under some splendid

specimens of such Ferns as *Dicksonia antarctica*, *Cyathea medullaris*, *Dicksonia squarrosa*, *Alsophila excelsa* and *australis*, and then you are led up, so as to get a sight of the tops, which is quite enchanting. The crevices of the rocks have mosses growing in them most luxuriantly; a large number of species, many of them rare, having been collected from their various habitats specially for this purpose. *Todeas* also are the near neighbours of these, and many species of *Trichomanes* and *Hymenophyllum* are beginning to make themselves conspicuous. There are also to be found hanging from the roof, in company with Ferns, and in various other parts of the house, many orchids from the temperate regions of Peru, Guatemala, Mexico, &c., and thriving well—indeed, the whole collection is in excellent health and keeping, reflecting great credit on Mr. Milford, the gardener in charge of this department. The whole place is splendidly constructed, the proprietor having spared no expense in fitting it up; and here, certainly, the money has been judiciously expended, and the work finished in a most creditable manner.

At Helensburgh, near Glasgow, the seat of R. Henderson, Esq., I saw a fine Fern house in course of construction, and feel sure that, when it is completed, it will be a charming place, the worthy proprietor being a most enthusiastic lover of plants. The place will be famous for *Cyathea dealbata*, the Silver Tree Fern of New Zealand, Mr. Henderson having imported this in large quantities, and now possesses specimens of it not to be equalled in the three kingdoms. Again, at Newcastle, — Perkins, Esq., has a beautiful little Fernery, and many rare species are to be found thriving admirably in it. Space will not permit me to describe more, but at T. Bowley's, Esq.,

of Dublin; at Mrs. White's, of Killakee, near Dublin; at Lady Dorothy Nevill's, near Petersfield; and at many other places, fine Ferneries exist in excellent condition.

Some of the exotic Ferns will grow in Baskets (see page 33), with moss to keep the mould in, and they produce a grand effect in a Fernery when suspended from the roof or planted on the summit of a jutting rock, so that the fronds hang over it. Others thrive on old blocks of wood, to which they should be firmly tied with wire, having a good layer of moss between the plant and the block. Those on blocks and Baskets will require a good syringing twice a day in summer; it is also well to take them down two or three times a week, and soak them thoroughly, by dipping them in tepid water, for when grown thus, they need more water than in pots. Ferns grown in Baskets or on blocks suspended from the roof often look very beautiful, as the under sides of the fronds, often peculiarly interesting, are then more distinctly seen.

Those not having sufficient space to devote a house to the special culture of Ferns, may indulge their tastes for them in conjunction with other plants, by building rock-work up the end of the conservatory, stove, or orchid house, and planting Ferns in the crevices. A beautiful example of this exists in one of the houses of C. B. Warner, Esq., of Hoddesdon, where the end wall, about fourteen feet high, is covered with climbing and other Ferns, such places being admirably adapted for the display of these climbing species. (See descriptive list.) At the bottom of the rock-work is a piece of water, in which there are *Nymphaea caerulea*, *N. rubra*, and other plants; the water, which is supplied from a slate cistern, flows over the rocks into the rustic sort of basin in which it is contained. This

rock-work basin has been erected at great expense, and is certainly one of the best pieces of work I have seen. It is made to represent stone, by using burs and cement, and was executed by Mr. J. Pulham, of Broxbourne, Herts., who is a good hand at building rock-work in imitation of stone. There are many others who do this work, but I have never seen it so well executed as by Mr. Pulham. The Ferns in rock-work are planted in soil composed of leaf mould, loam, and peat, well mixed, but not chopped too fine—a depth of from six inches to a foot is quite sufficient. They generally give the Ferns fresh soil once in two years, and find the month of February is the best time for doing so. Those that are climbing up are not disturbed, but receive a sort of top-dressing; the others are taken up, some of the old soil is shaken from their roots, and they are then replanted in fresh soil, giving them but little water till they begin to root, after which they are abundantly supplied. Those on the rock-work are watered with a pail-engine, having a spreader on the nozzle, which prevents the water driving too heavily on the fronds. In this house there are many stove flowering orchids and fine foliage plants, which have a beautiful effect.

At the residence of R. Warner, Esq., Broomfield, Chelmsford, also, I have seen a very nice little Fernery at the end of the orchid house, in which the Ferns are arranged with great taste, and the orchids in bloom are taken in to contrast with the Ferns; the whole has a delightful effect, and the more we could see this done in our orchid and Fern houses the more admirers we should find for them. There is a square tank of water in it, a little above the floor level, edged all round with *Selaginella hortensis*, over which a fine plant of *Cyathea princeps* rears its stately crown of fronds; other smaller species, such as *Adiantum*

cuneatum, and the beautiful *Lomaria gibba*, which makes a splendid object when grown into fine specimens, are placed upon pots, raised just above the surface of the water, while *Nymphæas*, and a few other small-growing aquatic plants, afford contrast of foliage, and add much additional beauty to the place. I saw here, likewise, two Baskets suspended, full of *Adiantum affine*, doing splendidly. They were perfect globes, hiding the Basket entirely with the dense mass of fronds.

Mr. Penny, gardener to H. Gibbs, Esq., Regent's Park, has introduced Ferns among his cool orchids, and I must say I never saw *Odontoglossums*, *Lycaste Skinneri*, and many other cool orchids, doing better. I noticed fine specimens of *Lomaria nuda*, *Todea superba*, and many species of *Adiantum*. Over them were suspended orchids on blocks, and the moisture rising from the Ferns seemed to make them root out, and grow more freely. Also in a lobby separating the orchid houses, some fine specimens of such Ferns as *Gleichenia flabellata* and *dicarpa*, *Adiantums*, &c., were growing, and producing a charming effect.

LIST OF AQUATIC PLANTS SUITABLE FOR A SMALL LAKE IN THE FERNERY.

TEMPERATE HOUSE.	TROPICAL HOUSE.
<i>Alisma lanceolata</i> (Lance-leaved Water Plantain)	<i>Acrostichum aureum</i> (Marsh Fern)
— <i>Plantago</i> (Great Water Plantain)	<i>Ceratopteris thalictroides</i> (Floating Stag's-horn Fern)
<i>Aponogeton angustifolium</i> (Narrow-leaved Arrow Grass)	<i>Cyperus alternifolius</i> (Alternate-leaved Cyperus)
— <i>distachyon</i> (Two-spiked Arrow Grass)	— <i>variegatus</i> (White-striped Cyperus)
— <i>monostachyon</i> (Simple-spiked Arrow Grass)	<i>Euryale ferox</i> (Prickly Euryale)
<i>Calla palustris</i> (The Marsh Calla)	<i>Limnocharis Humboldtii</i> (Humboldt's Yellow-flowered Limnocharis)
<i>Callitriche verna</i> (The Water Starwort)	

TEMPERATE HOUSE.

- Hottonia palustris* (The Water Violet)
Hydrocharis morsus-ranæ (The Frog Bit)
Lemna minor (The Lesser Duckweed)
 — *trisulca* (The Ivy-leaved Duckweed)
Myriophyllum spicatum (The Spiked Water Millfoil)
 — *verticillatum* (The Whorl-leaved Water Millfoil)
Nymphaea alba (The White English Water Lily)
 — *pygmæa* (The White Chinese Water Lily)
Nuphar advena (The Stranger Water Lily)
 — *lutea* (The Yellow English Water Lily)
Pontederia cordata (The Heart-leaved American Pontederia)
Richardia æthiopica (The Ethiopian Arum)
 — *maculata* (The Spotted Ethiopian Arum)
Sagittaria sagittifolia (The Arrowhead)
Stratiotes aloides (The Water Soldier)
Trapa natans (The Floating Water Caltrops)
Vallisneria spiralis (The Spiral Vallisneria)
Villarsia nymphæoides (The Nymphaea-like Villarsia)
 — *lacunosa* (The Smooth-flowered Villarsia).

TROPICAL HOUSE.

- Nelumbium speciosum* (The Sacred Bean)
Nymphaea cærulea (The Blue Egyptian Water Lily)
 — *cyanea* (The Blue Indian Water Lily)
 — *gigantea* (The Blue Australian Water Lily)
 — *Lotus* (The White Egyptian Water Lily)
 — *odorata* (The Sweet-scented Water Lily)
 — *rubra* (The Red Indian Water Lily)
 — *stellata* (The Star-flowered Water Lily)
Oryza sativa (The Common Rice)
Ouvirandra Bernieriana (Bernier's Water Yam)
 — *fenestralis* (The Lattice-leaf or Water Yam)
Papyrus antiquorum (The Egyptian Paper Reed)
Pistia Stratiotes (The Water Lettuce)
Pontederia crassipes (The Thick-footed Pontederia)
Trapa bicornis (The Two-horned Water Caltrops)
 — *quadrispinosa* (The Four-horned Water Caltrops)
Villarsia indica (The Yellow-flowered Indian Villarsia)
 — *ovata* (The Egg-shaped-leaved Villarsia).

BASKETS, AND FERNS BEST SUITED FOR
GROWING IN THEM.

IN a work of this kind, a few words upon Baskets and Basket Ferns is quite essential, as many species can only display themselves to advantage, or even with any degree of justice, when they are suspended. Those species, such as *Goniophlebium subauriculatum*, *Cheilanthes spectabilis*, &c., &c., are magnificent objects when grown in this way, and add materially to the beauty and enjoyment of a Fern house. In a collection of Ferns grown

in a natural manner, plenty of spots present themselves—such as overhanging or projecting portions of the rock-work—where those species of pendulous habit can be planted, and have a fine effect, without resorting to Baskets; but those not possessing the advantage of rock-work, can beautify their houses by suspending the plants from the roof. To assist in the selection of plants for this purpose, I have given at the end of this chapter a list of fifty species which are well adapted for, or display their beauties better when suspended from, the roof of the Fern house. The numbers could have been considerably increased if it had been thought necessary, but as many others, in addition to those referred to, are specially named in the descriptive part of this work, the repetition of more is quite needless. A great mistake, and one that is frequently fallen into in choosing a Basket, is to select one with an elaborate design worked in or upon it, for though it may look very pretty when purchased, if the plants thrive that are placed in it—and to this end they are so planted—no matter how elegant the pattern, very little of it will be discernible. Let it not be imagined, however, that the shape should not be studied. What I recommend is the selection of a Basket with an elegant outline, never heeding the details of the pattern, for the outline is the only part distinguishable when the plants are growing vigorously in it. The Baskets I would recommend for use in the Fernery are those constructed of galvanised iron wire, for they do not rust, they are reasonable in price, and supply all that is needed of a Basket. In preparing them for the plants, a thick layer of sphagnum moss should be placed next the wire at the sides and on the bottom, to prevent the soil washing through. The compost best suited for this

purpose is a mixture of fibrous peat and chopped sphagnum moss, with the addition of some silver sand and rough charcoal. After planting, the whole should be well soaked with water before being placed in position; the plants will require, and enjoy, a gentle syringing over their fronds every day during the summer months, and the Baskets should be taken down two or three times in the course of a week to be thoroughly soaked with water.

For the sitting-room windows of the dwelling-house, also, Ferns suspended in Baskets have a charming appearance, but here a little difference must be made in the kind of Basket to be used. It may be constructed of any material, size, or pattern, and the Ferns or other plants to be grown must be planted in a zinc pan made to fit it, and thoroughly drained. This prevents the disagreeable dripping of water which had caused this style of in-door gardening to fall into bad repute. The Ferns to be used in such situations must be of a more hardy nature and constitution than those adapted for the tropical Fern house, and should be selected from those which are natives of temperate regions. These can be easily ascertained, by reference to the descriptive part of the work, where the countries of all the species are given.

BASKET FERNS AND LYCOPODS.

Acrophorus	Goniophlebium
— affinis	— verrucosum
— chaerophyllus	Humata heterophylla
— immersus	Llavea
— pulcher	— cordifolia
Adiantum	Lycopodium
— affine	— Hookerii
— caudatum	— Phlegmaria
— colpodes	— taxifolium
— concinnum	— verticillatum
— cuneatum	Niphobolus
— Féei	— pertusus
— lunulatum	— rupestris
— setulosum	Nothochlæna
Asplenium	— rufa
— flabellifolium	— sinuata
— flaccidum	— trichomanoides
— incisum	Platyterium
— reclinatum	— albicorne
— rhizophorum	Platyloma
Cheilanthes	— flexuosum
— spectabilis	Pleopeltis
— tenuifolia	— angustatum
Doodia	— stigmatica
— lunulata	— venustum
Drynaria	Pteris
— diversifolia	— scaberula
— musæfolia	— serrulata
Elaphoglossum	— — angustata
— viscosum	— — polydactyla
Goniophlebium	— ternifolia
— piloselloides	Selaginella uncinata
— subauriculatum	Woodwardia orientalis
	— radicans.

GROWING FERNS IN GLASS CASES.



IN the country, where there are unenclosed wastes or commons, where rocky caves and woody dells, shady lanes and running streams, are found, those with whom Ferns are favourites may find continual recreation and enjoyment in searching out the places where they grow most freely, and observing their habits in their natural state. Notwithstanding this, both in the country, and also in town residences, connected with which there are greenhouses and frames, as well as other glass structures—the cheapness of glass rendering such luxuries by no means uncommon—Ferns are frequently cultivated in

Glass Cases, on account of the facilities which these simple and often elegant little structures afford for observing the development and changes in the graceful form and delicate foliage of the species for which they are specially adapted. Indeed, in a city or a town house few objects of ornament look more attractive, whether placed in the window or elsewhere; and few objects, moreover, are capable of becoming greater sources of instruction and pleasure, than the miniature wildernesses often seen in a Wardian Case of well-grown Ferns.

Many Ferns will grow well in Glass Cases, in a warm room, where they can have plenty of light but not much sun: some of them will grow even in the dense atmosphere of London. Of those best adapted for this purpose, a list is appended at the end of the present chapter. I have seen *Trichomanes radicans* growing beautifully in a Case in close parts of the City, and have had *Hymenophyllum tunbridgense* growing in a very small Glass Case—in fact, in a bottle—for the last two years, in a little silver sand at the bottom, and the bottle corked up tightly, so that no air can get at it, except when I take out the cork to give it a little moisture. This is always kept in a room where it has plenty of light. *Hymenophyllum unilaterale* (*Wilsoni*) can also be grown in the same way, but they both look best planted in a Glass Case of moderate size.

The other species of Ferns must not be kept close in cases. In preparing for planting, the first thing is drainage. This should be spread over the bottom to the depth of an inch or more, and then covered with a thin layer of sphagnum moss to keep the drainage material from becoming choked; for, when this happens, the soil soon becomes sour, the plants lose their vigour, and become

yellow and unsightly, and, if a remedy is not speedily applied, they will die altogether. Having the drainage properly arranged and covered, the Case can be filled with a mixture of peat, silver sand, and small pieces of broken sandstone, to keep the soil porous. Large blocks—that is, blocks of suitable proportion to the size of the Case—should be stood up, with their base embedded in the soil, to allow small creeping kinds to cling to and cover them, thus forming beautiful objects of themselves, and diversifying the surface of the Case, forming miniature hills and dales. Care must be taken, however, that such things are not studied at the expense of the Ferns or other plants. The error of fitting up a Fern Case with a quantity of objects of curiosity, such as fossils, shells, minerals, &c., &c., is one too often fallen into, and the Ferns only become of secondary importance. What I advise is to diversify the surface with blocks of porous sandstone in suitable quantity, and have them entirely covered with some small creeping Ferns, so that the plants are the objects of attraction. Many of the small species of *Hymenophyllum*, *Trichomanes*, *Nipholobolus*, *Davallia*, *Polypodium*, *Asplenium*, &c., are admirably adapted for such places. There are many of the Filmy Ferns which will succeed planted with the others; but again, many species will not, for, on account of their delicate fronds being so very membranaceous, they require a moister and closer atmosphere than is conducive to the health of the more hardy ones; indeed, a Case devoted entirely to this family is one of the most attractive and elegant ornaments a room can possess. I have seen a fine large Case entirely filled with our native Killarney species (*Trichomanes radicans*), producing a charming effect with its graceful lively green fronds,

and considered by its owners the chief ornament of their dining-room. These Cases require to be kept close and moist, or the delicate fronds of many will shrivel.

I keep a stock of these Cases ready made for sale, some with Ferns in them. Also a stock of bell-glasses, with ornamental stands, for growing Ferns under, and which are well adapted for the cultivation of a few kinds by those who have not inclination or sufficient room for Cases of larger size; and further, a variety of Baskets adapted either for the Fernery or dwelling-house.

Do not keep the Ferns too wet: only just keep the soil moist. To grow Ferns in perfection in Glass Cases, they ought to have fresh soil every year, and the best time to effect this operation is March or April, this being about the commencement of their growing season: the long dark days of winter being past, and the sun having made the atmosphere more genial, they soon feel its effects, and commence to develope their delicate young fronds; consequently they will soon increase in size, to attain which, they must have a renewal of soil to draw nourishment from. The Ferns should be taken up very carefully, so as not to injure the roots and young fronds, for if the roots are injured, the growth of the plants is checked until fresh ones are produced. If any are dead, or in a decaying state, let them be removed with a sharp knife. The old soil must be partially shaken away; but this operation must be performed with discretion, for if not, the young fronds are sure to suffer. Another very important point is the giving air: after having replanted and comfortably settled the plants, they will require light shading, and air must be admitted very slightly until they give indications of having commenced drawing nourishment from their new supply of food.

LIST OF FERNS ADAPTED FOR A WARDIAN CASE
OR FERN SHADE.

Acrophorus	Asplenium
— affinis	— myriophyllum
— chærophyllus	— obtusatum
— immersus	— obtusilebum
Adiantum	— præmersum
— affine	— viviparum
— assimile	Blechnum
— Capillus-Veneris	— Lanceola
— caudatum	— longifolium
— chilense	— occidentale
— colpodes	Campyloneurum
— cuneatum	— angustifolium
— formesum	— repens
— hispidulum	— rigidum
— macrophyllum	Cheilanthes
— reniforme	— alabamensis
— setulesum	— argentea
— tenerum	— capeusis
— tinctum	— fragrans
Anemia	— hirta
— adiantifolia	— viscosa
— Dregeana	Cystopteris
Anemidictyon	— bulbifera
— Phyllitidis	— tenuis
— — angustifolium	Davallia
— — fraxinifolium	— bullata
Asplenium	— canariensis
— alatum	— dissecta
— alternans	— pentaphylla
— attenuatum	— tenuifolia
— Belangeri	Diplazium
— brachypteron	— lanceum
— dimorphum	— zeylanicum
— erectum	Decidia
— flabellifolium	— aspera
— flaccidum	— — corymbifera
— Hemionitis	— caudata
— Hookerianum	— conflucis
— marinum	— lunulata
— monanthemum	

- | | |
|--------------------------|----------------------|
| Doryopteris | Lomaria |
| — palmata | — Patersoni |
| — sagittæfolia | — vulcanica |
| Fadyenia | Lygodium |
| — prolifera | — palmatum |
| Goniopteris | Meniscium |
| — asplenioides | — simplex |
| — crenata | Microlepia |
| — gracilis | — scabra |
| — scolopendrioides | Nephrodium |
| Gymnogramma | — molle corymbiferum |
| — Calomelanos | Niphobolus |
| — chærophylla | — bicolor |
| — chrysophylla Lauchiana | — Lingua |
| — flexuosa | — — corymbiferum |
| — rufa | — pertusus |
| — tomentosa | — rupestris |
| Gymnopteris | Nothochlæna |
| — quercifolia | — sinuata |
| Hemionitis | Onychium |
| — cordifolia | — auratum |
| — palmata | — japonicum |
| Hymata | Platyloma |
| — heterophylla | — Brownii |
| — pedata | — rotundifolium |
| Hymenophyllum | Pleopeltis |
| — all the species | — peltidea |
| Hypolepis | — pustulata |
| — distans | — stigmatica |
| Lastrea | — squamulosa |
| — decurrens | Polypodium |
| — olegans | — hastæfolia |
| — glabella | — pectinatum |
| Litobrochia | — sancta |
| — denticulata | — Schkuhrii |
| — leptophylla | Polystichum |
| — vespertilionis | — denticulatum |
| Lomaria | — falcinellum |
| — ciliata | — mucronatum |
| — fluviatilis | — triangulum |
| — Gormainii | — — laxum |
| — gibba | Pteris |
| — lancoolata | — croatica |
| — nigra | — — albo-lineata |
| — nuda | — crenata |

Pteris

- *geranifolia*
- *hastata*
- *heterophylla*
- *longifolia*
- *scaberula*
- *semipinnata*
- *serrulata*
- — *angustata*
- — *cristata*

Rhipidopteris

- *peltata*

Schizæa

- *pusilla*

Scolopendrium

- *Krebsii*

Selaginella

- all the species

Stenochlaena

- *heteromorpha*

Stenosemia

- *aurita*

Todea

- *Fraseri*

- *hymenophylloides*

- *superba*

Trichomanes

- all the species

Woodsia

- *obtusa*

- *polystichoides*

- — *Veitchii*.



FERNS FOR THE DECORATION OF THE DINNER
TABLE.

I WILL just say a few words in this place upon the uses of Ferns as decorative objects for the dinner table. Many can be grown in pots, and placed in vases when brought into the dwelling-house for use. Such kinds as *Adiantum cuneatum*, *macrophyllum*, *tenerum*, *tinctum*, and various other species of this genus; *Anemia adiantifolia*, *Anemi-*

dictyon Phyllitidis, *Asplenium Belangeri*, *cicutarium*, and many others; *Lomaria gibba*, *nuda*, and *Fraseri*; *Gymnogramma Calomelanos* and *Laucheana*; *Cheilanthes elegans* and *tenuifolia*; *Davallia dissecta*, *elegans*, and other varieties; *Pteris serrulata angustata*, and many of the taller-growing *Selaginellas*, are beautiful objects for this purpose; and many others might be enumerated equally well suited for the decoration of the festive board. Some species, however, though very elegant, cannot be had in such good order through the winter months. I allude to such as *Gymnogrammas*, *Selaginellas*, and some of the deciduous kinds. These should have some of their fronds cut off, and carefully dried, in summer, when they are growing freely. (For Directions for drying Ferns, see page 49.) They are not then missed from the plant, and do not detract from its beauty; when dry the fronds must be carefully preserved, and brought into use in winter, when they will be found of great service for decorating the flower stand, for the table, or for arranging in a vase to represent a growing plant. In this manner a great diversity of foliage can be had, and of many kinds that are too delicate to stand either as plants in the vase, or in the shape of cut fronds, and arranged with flowers in the stand. The illustration is a sketch of one of the best flower stands for dinner-table decoration that I have seen, and to arrange such a one in good taste Fern fronds, either in a dried or living state, are indispensable. Care must be taken, in dressing one of these stands, not to crowd them with great variety or over fill them; a few simple medium-sized flowers, properly and tastefully associated with foliage, being more effective and pleasing than a huge display of large flowers and glaring colours. Small fronds of *Lygodiums*, or

frondules of *Selaginellas*, have a beautiful effect trained round the shaft of the stand, and are equally good, if not preferable, in a dried state, for they do not then shrivel, as the tender living ones are apt to do; but I will now leave this subject, feeling sure that practice, with natural good taste, is a far better guide than any rules that can be laid down.

PROPAGATION OF FERNS.

FERNS are propagated in different ways; viz., by dividing the plants, and by spores. Many of them may be very easily increased. The best time of the year for dividing the plants is March or April. Some of the species have a creeping caudex, and are increased by cutting them into pieces, each piece having a part of the root attached, and some of the fronds. Other species are not so easy to propagate; their caudex is not creeping, but erect and tufted, forming single or compound crowns. These must be cut apart with a sharp knife, and some of the roots, with a portion of the fronds, should be attached to each piece. After this, pull them to pieces with the hand, and pot these in small pots, in the material recommended for the small species of Ferns. When potted, place them in a close frame till they are rooted; give but little water, just enough to settle the mould, and keep the frame shaded from the sun till they begin to root, when they may be moved into some cool shady place.

Ferns may be raised from spores collected from the under side of the fronds, and these should be gathered

as soon as they are ripe. The best plan is to secure the frond just as the spore-cases are about to burst, and placing it in a piece of paper, put it under slight pressure into some dry warm place for a few days, by which time most of the spore-cases will have burst, and the spores will be ready for sowing.

The spores of some species take a long time to germinate. I have known many of the arborescent kinds to be twelve and eighteen months before any sign of vitality appeared; others, such as the *Gymnogrammas*, and some *Adiantums* and *Aspleniums*, &c., will come up freely in a week or two. In raising Ferns from spores under glass, great care must be taken as to the supply of water whilst they are in the *prothallium* state, for if more is given than can be taken up by the soil and plants, it causes them to rot, and produce a fungoid growth which soon smothers everything; whilst, on the other hand, if kept too dry, the plants soon shrivel completely up. In sowing, fill the pots or pans three parts full of drainage, then place a layer of moss, and fill up with fine earth, pressing it down a little with the hand; then sow the seed on the top—but before sowing, give the earth a gentle watering. After sowing, place a bell-glass over the pots (a flat piece of glass answers the purpose equally well), and keep them close till they begin to vegetate. A little air may then be given by tilting the glass. As they begin to root they require air: they must, however, always be kept tolerably damp. It is quite desirable that the soil should be baked before the spores are sown, as this destroys small worms, which are very troublesome when they begin to vegetate. This process will also destroy such seeds as may be in the earth, that would smother the young Ferns as they came up, so that, by

baking the soil before using it, you will get rid of all such pests. As soon as they are large enough to prick into pots or pans, it should be done, as they are very apt to damp if allowed to crowd and overgrow each other in the seed pot, and the oftener they are transplanted the better. When they begin to make strong fronds, pot them separately, always bearing in mind, on account of their tenderness, to keep them in a rather close atmosphere and well shaded, until they are established.

Ferns are also propagated readily from the little bulbils which many of the species form on the upper side of the rachis, or from its apex, or on the segments. I allude to such as *Woodwardia radicans* and *orientalis*, *Asplenium viviparum* and *bulbiferum*, *Adiantum caudatum* and *lunulatum*, *Hemionitis palmatum*, *Stenosemia aurita*, &c. To cause these to root, the kinds which produce young ones from their points must have them pegged into the soil, and not removed from the parent plant until the young one has made a few fronds and roots. Those which form the young ones on the fronds require the pinnæ to be taken from the old plants, and pegged down on some soil, when the bulbils will quickly root and make good plants.

When Ferns are grown in a warm, damp house, the seeds will vegetate in different parts, and soon make good plants. After they are rooted, take them up and pot them if they are wanted. I have seen the front walls of a vinery covered with seedling Ferns: the fronds which hang down look very beautiful, especially those of *Adiantum Capillus-Veneris*, the true Maiden-hair Fern, and the *Scolopendrium vulgare*.

The demand for this class of plants is now very great, and we find almost every nurseryman devoting some space

to their culture, and, in some instances, making them his principal study. While, in the beginning of the present century, we had not more than about forty species of exotic Ferns in the country—indeed, when my “Hints on the Cultivation of Ferns” was written, they were not looked upon with favour generally, and private collections were very rare—some very extensive collections are now to be found in the gardens of private gentlemen, where they are looked upon as quite a leading feature in their establishments. We have now, I suppose, in cultivation, of exotic species alone, between ten and eleven hundred, whilst the native species have wonderfully increased in forms and varieties—so much so, that a complete list of them forms a large catalogue. To fashion and the rapidly improving national taste we must attribute this vast increase. A demand for them for decorative purposes soon caused the world to be searched for new forms; but notwithstanding all we have introduced, numerous fine kinds are yet to be brought from various parts of the world, and I hope many will soon gladden our eyes in this country, so as to compel me to prepare another edition of this Manual.

INSECTS.

FERNS are liable to injury from several kinds of insects, chiefly, however, thrips, brown scale, and green fly. Of these, the thrips is certainly the worst; it causes much destruction if its ravages are not quickly stopped. It is a small black insect (white while young), congregating

on the under side of the pinnæ, and piercing the cuticle, which it soon disfigures and destroys. Ferns that are natives of temperate regions are very liable to suffer from this pest if subjected to too high a temperature, thus proving that an acquaintance with the natural localities of plants is a great acquisition to the cultivator. If, however, through insufficient moisture in the air, or to the roots, in conjunction with improper ventilation, the Ferns have become infested with this insect, means must be at once taken to destroy it. Many powders have been recommended, but I have not found any plan for destroying it so effective as fumigation with tobacco, or well-made tobacco paper.

The scale generally appears on the under side of the fronds, and on the stipes and rachis, and is very difficult to remove. The best method of accomplishing this is careful washing with a sponge and clean water. In doing this, great care must be used to avoid bruising or injuring the fronds. Cleaning the fronds of Ferns in this manner is very tedious work, but it is the only way of getting rid of this pest. When the fronds infested with scale are old, the best way is to cut them off; but the whole, or even the greater part of the fronds, must never be cut away at once, however full of insects they may be. I once destroyed a beautiful specimen plant of *Cheilanthes elegans* by cutting away all the fronds at once, because they were completely covered with scale.

The most effectual mode of destroying thrips or green fly is by smoking the house with tobacco. The best time to do this is after the house is shut up in the evening. It is better to smoke the house moderately, and repeat the operation in two or three days, than to attempt to destroy

them at once; too much tobacco smoke may injure the plants, and a less quantity repeated two or three times will secure the object more effectually.

The well-known cockroach is also very destructive to this class of plants, eating the young tender fronds in their progress to maturity, and this pest must be carefully searched for and destroyed, or successful culture will never be attained. Being night marauders, they must be diligently looked for by candle-light, as they will be out feeding after dark. By the use of a beetle poison, which I keep on sale, many can be destroyed. This should be placed in small quantities on pieces of broken pots, and distributed through the house, and, to prevent unsightliness, should be removed in the morning, repeating the process until you are free from their depredations. Trapping is another means for destroying both them and woodlice, which are also a great source of annoyance: it is done by placing some small flower pots, with moss in them, in different parts of the house, which must be looked at frequently. Many may be caught in this way, as they are very fond of hiding in such places when not active. Slugs and snails, though not insects, may be spoken of in connection with them, as being very destructive, if they are not kept under by diligent search. The little *Helix alliaria* is a great destroyer of delicate young fronds, and, if allowed to increase in numbers through negligence, will be the cause of much vexation and annoyance. The best means to rid the house of these destroyers is to lay pieces of apple, potato, or turnip in places they frequent, which will be sure to attract them; and if these things are looked over once or twice a day, the little enemies can be destroyed.

DIRECTIONS FOR DRYING FERNS.

A COLLECTION of dried Ferns is useful and highly interesting for reference at all times of the year, provided they are properly dried, and correctly named. They serve to refresh the memory at any time. To young gardeners in particular they are very useful, and when dried they do not take up much room. I have for some years past kept dried collections of British and Exotic Ferns and Lycopods, which I find very useful, for sometimes their names are apt to be forgotten, and then, if they are dried and properly named in the herbarium, they can be easily recovered.

When they are kept on white paper they look extremely handsome. I have some Ferns and Lycopods that have been dried for many years, and they look as well now as when first done. The way in which I dry my Ferns is very simple, but it answers the purpose well. I first get two pieces of board, about three feet long and a foot and a half wide, then some paper—blotting paper, or any kind that absorbs the moisture rapidly will do. In taking specimens for drying, the first thing to observe is the perfect state of the fronds; some Ferns, such as *Ilavea cordifolia*, *Stenosmia aurita*, *Nephrolepis davallioides*, &c., &c., have the fertile fronds either wholly different or partly contracted; therefore it should always be borne in mind that a perfect specimen includes every characteristic part.

The small-growing species ought to be taken up with the roots and dried entire. Shake the soil off from the

roots before you put them into paper. When the specimens are ready, place three or four sheets of paper on one of the boards, then one of the fronds on the top of the paper. The quantity of paper required between each specimen will vary with circumstances; for small species, and those not very succulent, four or five sheets will be sufficient, but more will be required for some of the larger kinds. Keep on thus till you get all your specimens in, by placing two or three sheets of paper between every frond, according to size; if the latter are small, you can place two or three in one sheet. After they are all put together, then place the other board on the top of them; get something heavy—say about ten or fifteen pounds weight—and place it on the top of the board. Let them remain for three or four days, then give them fresh paper and place them as before, following the same plan until you get all dried; but be careful always to keep the specimens in a dry place, for if allowed to get damp they soon become useless. If more specimens are gathered, they must be put by themselves in the same way as the former; but be careful not to put too many under the process of drying at once, unless you put them in separate places. After they are all dried, get some white paper, and put each specimen by itself on a sheet; after that is done, then have a slip of paper for each, for the purpose of writing its name on, and the station from which it was gathered, and if a native or cultivated specimen. When they are mounted upon the sheets and correctly named, they should be done up in bundles so as to be readily put away. They may be arranged in two ways—the first is on an alphabetical system; the second is to have the genera grouped together according to their natural affinities. The first is the easiest for

mere reference, but the latter is by far the most interesting and instructive. After this, they may be deposited in any convenient place that is dry and excluded from the air, to be taken down and examined as occasion or pleasure may dictate—in either case, they will be a source of perpetual pleasure, well repaying the labour bestowed.

I have also seen them used for making pictures for the sitting room, by fastening them down with gum upon paper or cardboard, and then framing them. They can be made very ornamental in this way, if a good design is made, and they retain their beauty a long time if strong sun-light is kept from them. For dinner-table decoration, also, in winter they are exceedingly useful and very handsome, for, if properly arranged, no stranger could tell if they were living fronds or not. This practice is of great service with such plants as the *Gymnogrammas*, the fronds of which so soon shrivel after being cut from the plant. In this way, fronds may be made to do duty the whole winter, and if they are gathered in summer, when they are making them freely, it will not injure the appearance of the plants. *Selaginellas* are also of great service for the same purpose when dried, and also for the decoration of the dessert table in winter, when leaves are scarce.

DESCRIPTIVE LIST OF EXOTIC FERNS.

THE following species are those I consider to be the best and most worthy of cultivation of those with which I am acquainted. They have been selected with very great care from the numbers which are now cultivated, so that a lover of these plants may be able to find some among them suitable for any particular purpose, be that the ornamentation of a lady's hair, the decoration of the dinner table, the furnishing of a Wardian Case or Fern Shade, or, indeed, the ornamentation of any place, either in the dwelling-house, the plant house, or open air. I have also added such particulars respecting the culture of each genus as I think necessary, and such as, if followed, will enable any one, whether an amateur or practical gardener, to produce good specimens of these beautiful and highly ornamental plants.

ACROPHORUS.

A very pretty group of Ferns, all of which are handsome, but some of the species are charming objects; several will grow well in a Wardian Case, and others are valuable for cutting for bouquets. They are easy to manage, only requiring to have the pots well drained, and to be planted in good peat and sand, with the addition of some small pieces of sandstone. The deciduous

kinds, though not requiring so much water as when in a growing state, must upon no account be allowed to become dry, or they will be in danger of perishing altogether, or starting into growth again very weakly, through exhaustion.

A. affinis.—A beautiful species, with dark green tripinnatifid somewhat triangular fronds; the pinnae dense and overlapping each other; rhizome creeping on the surface and scaly. This makes a pretty plant in a Wardian Case, and is very useful for cutting for bouquets when grown in the Fernery. Native of Singapore, Borneo, &c.

A. chaerophyllus.—This is a very handsome species, somewhat in the way of *affinis*, but the segments of the fronds are more finely divided. It grows from six to eighteen inches high, and makes a beautiful addition to the Wardian Case. Native of the East Indies.

A. hispidus.—A most beautiful evergreen, cool house, dwarf-growing Fern, admirably adapted for a Wardian Case. The fronds are tripinnate and ovate acuminate, from six to ten inches in length, and dark shining green in colour. This elegant plant almost equals the Filmy Ferns in beauty, and should be grown by every one; it is an evergreen species, thriving well in the clefts of rock-work. Native of New Zealand.

A. immersus.—This is a deciduous species, and unlike the previous one, its slender rhizomes are under ground; fronds smooth, deltoid, bipinnate or tripinnate, pale green in colour, and from ten to twenty inches in length; a very distinct and handsome Fern, well worthy of a place in all collections. It will make a very handsome specimen suspended in a Basket for the summer months. It is distributed throughout India and most of the adjacent islands.

A. pulcher.—A beautiful Fern, well deserving a place in any and every collection. It succeeds admirably in the Fern Case as well as the Fern house. The fronds are many times divided; segments very finely cut, and vivid green in colour. A very desirable species from the East Indies.

ACROSTICHUM.

A. aureum.—This noble Fern requires to be treated as an aquatic; it is found growing in swampy places in all parts of the Tropics. The fronds rise from an erect caudex, and are pinnate, smooth, and from two to eight feet high; pinnae entire and broad; the fertile fronds are contracted, densely sporangiferous on their under side: colour brilliant green. It makes a splendid object where room and proper situation can be afforded it. An evergreen stove aquatic, which should be potted in peat and loam, and requires abundance of heat and moisture to grow it to perfection.

ACTINIOPTERIS.

All Fern growers will hail with delight the introduction to cultivation of this lovely little species. It is a plant widely distributed, being found in Northern India, Ceylon, Madras, Egypt, Arabia, and various other places which I need not name. In form it is a perfect miniature of the Fan Palm *Latania borbonica*. It should be planted in good fibrous peat and sand, with small lumps of sandstone intermixed.

A. radiata.—A charming little palm-like plant, of tufted habit, producing fronds from three to six inches in height, flabellate, the segments divided about half the distance down, and light green in colour: a beautiful and



ADIANTUM FARLEYENSE. *Moore.*

West Indies.

distinct Fern. Nothing that I am acquainted with is at all like this plant, except *Rhipidopteris peltata* (given in another part of this book), but which is eclipsed by this lovely gem. Native of the East Indies, Ceylon, &c.

ADIANTUM.

This beautiful family is popularly known by the name of Maiden-hair Fern, from the rich black glossy stems common to most of the species. They have the curious property of repelling water, and, if wholly submerged, will be as dry when taken out as before. The species are widely distributed, their head-quarters being within tropical countries, although some are found in temperate regions. The fronds of many of them are admirably adapted for bouquet making, for wreaths for ladies' hair, and the decoration of the dinner table; also for Fern Cases, or for the sitting-room without a Case—indeed, some one of the many kinds can be used to advantage in any description of floral display. We have only one native species to represent this genus, which will be found in the descriptive list of British Ferns. They require good drainage, and, in most instances, plenty of pot room, if they are intended to be grown into large specimens, and should be potted in a mixture of fibrous peat and sand, with the addition of a little loam for the strong-growing kinds.

A. affine.—A very desirable greenhouse Fern of easy culture, producing, from a creeping rhizome, evergreen, glabrous, bipinnate or tripinnate fronds, about fifteen inches long; very useful for bouquets, and for Wardian Cases and Baskets. Native of New Zealand.

A. assimile.—A very delicate and beautiful plant, with smooth tripinnate fronds, from six to twelve inches long,

and bright green in colour; succeeds well either planted out in the Fern house or in a pot, and is well adapted for growing in Baskets and cutting for bouquets, as, indeed, nearly all this genus are. Native of Australia and New Zealand.

A. cardiochlæna.—A noble-growing plant from Caracacas, with large bright green fronds three or more times divided, usually about twelve or eighteen inches long, but sometimes attaining a height of three feet. A fine Fern for planting in the Fernery, or for exhibition, as it is one of the finest of its tribe. It is also known by the name of *A. polyphyllum*.

A. caudatum.—This is a distinct and handsome species, well adapted for hanging Baskets. It is an evergreen plant, with pinnate pubescent fronds about a foot or more long, proliferous at the apex; of a dull greyish green colour. Native of East Indies.

A. chilense.—A very pretty greenhouse Fern, with fronds of a glaucous green, triangular in shape. This neat and compact-growing species thrives well in a Wardian Case, and is well adapted for wreath making. Native of Chili.

A. colpodes.—This is an elegant species, and one well adapted for suspending in Baskets; the fronds are about two feet in length, in the young state delicate pink in colour, changing to rich green with age; it is also very suitable for bouquets. An evergreen stove Fern, from tropical America.

A. concinnum.—This charming evergreen stove Fern is well worthy a place in every collection, its pendulous habit making it a beautiful object when used as a Basket plant and suspended from the roof; fronds one to two feet in length, tripinnate, glabrous; stipes black; very



ADIANTUM EXCISUM MULTIFIDUM. *Moore.*

Garden variety.

useful for cutting. Native of South America and the West Indies.

A. cristatum.—This is a very fine plant, though, by mistake, the name is often applied to other kinds. The true species is stiff and rigid in growth, and dark green in colour; fronds tripinnate, somewhat triangular in shape, and from one to two feet in length. Native of the West Indies.

A. cultratum.—This species makes a noble ornament to the Fernery if allowed sufficient space; the fronds are about two feet in height, broad, of a light green colour, and tripinnate. An evergreen species, from Brazil.

A. cuneatum.—This Maiden-hair Fern is perhaps better known and more generally cultivated than any other, because one of the most graceful and useful: nothing indeed can equal its beautiful foliage for bouquets. It is of easy culture; the fronds, which are quadripinnate, and from six inches to a foot in length, rise from a tufted rhizome, the stipes and rachis are shining black, and the pinnules wedge-shaped. It is also well adapted for Wardian Cases, and for decorations in the dwelling-house, and being an evergreen species of free habit, is specially useful in winter. Native of Brazil.

A. curvatum.—A very fine species, but not always seen in such good condition as to show its beauty. The reason is, it requires more shade than any other Maiden-hair that has come under my notice; fronds large, tripinnate, glabrous, bright green in colour, the pinnæ much curved backwards, and the stem slightly hairy. A very desirable plant, from Brazil.

A. excisum multifidum.—This charming plant made its appearance in my own establishment, and, I may safely venture to say, it is one of the handsomest and most

useful of its genus. The fronds are quadripinnate; the pinnæ deeply cut, giving it a very graceful appearance; from twelve to eighteen inches in height, and rich dark green in colour; stipes and rachis black. The apex of every frond is frequently divided into several branches, which oftentimes are again divided, thus forming a beautiful tassel some two or three inches long, which is well represented in the figure. It partakes somewhat of the characters of *A. cuneatum* and *A. concinnum*, and will become one of the very best for bouquets or Wardian Cases.

A. farleyense.—This is one of the most magnificent of the Maiden-hair Ferns. It is a splendid species or variety for exhibition, as it grows from two to three feet high, with broad pendulous quadripinnate fronds, and the sterile pinnæ deeply fringed with almost crispy lobes. An evergreen stove plant, from Barbados, which Mr. Moore suggests may be a cristate form of *A. tenerum*.

A. Feei.—A very distinct species, of semi-scandent habit, and of a dull green colour; the rachis and stipes are covered with a rufous pubescence; the fronds are tripinnate in shape; this is a capital kind for cutting for bouquets, as it stands well after it is cut. A native of Mexico.

A. formosum.—This is a fine strong-growing and easily cultivated species; fronds light green in colour, and from one to three feet in height, quadripinnate, the pinnules small, the rachis pubescent; stipes rough, and shining jet black; these are produced from a slender creeping rhizome; it is one of the most useful for cutting for dinner-table decoration. Native of New Holland and New Zealand.

A. Ghiesbreghtii.—This beautiful plant has sprung up

in our gardens, and no one at present can say from whence it has come, or if it is an altered form of some species already in cultivation; if so, it has the power of reproducing itself true from spores. It is a fine large-growing kind, with somewhat the habit of *A. farleyense*, from which it is supposed to have been raised, but is quite distinct from that species.* The stipes and rachis are black and shining; fronds tri-pinnate, somewhat ovate, from ten to twenty-four inches in length; pinnæ large, slightly crenate at the margins, and bright green in colour. It will make one of the finest for table decoration or exhibition purposes. The name of *A. scutum* has been given to it in some gardens.

A. glaucophyllum.—This is a very beautiful small-growing species, the fronds several times divided; pin-nules in some instances cuneate, in others spatulate, the under side glaucous; sori large and conspicuous. It is an elegant plant for a Wardian Case, or for bouquets. An evergreen Fern, of quite recent introduction, from Mexico.

A. hispidulum.—A very handsome greenhouse Fern; fronds dark green in colour, from ten to twenty inches high, pedate or flabellate, the branches pinnate, the stem rough, being covered with short stiff hairs. Native of New Zealand and Australia.

A. intermedium.—An evergreen stove Fern, with fronds one to two feet long, bipinnate, dark green in colour,

* Mr. Moore informs me that this plant, which has been obtained from the spores of the fertile frond produced by *A. farleyense*, proves to belong to *A. Ghiesbreghtii*, which is itself probably only a variety of *A. tenerum*; and this circumstance, he observes, goes far to prove that *A. farleyense* itself, whose fertile fronds are never fringe-lobed like the barren ones, is but a subfertile suberistate form of *A. tenerum*.

with hairy stipes. A species well deserving a place in every collection. Native of Brazil and the West Indies.

A. lunulatum.—This is a very distinct and handsome species, of slender pendulous habit; the fronds are very bright green in colour, about a foot or more long, pinnate; pinnæ alternate and lunulate; stipes and rachis shining black, proliferous at the apex. It is a deciduous plant, and care must be taken in the winter season that it does not become dry. A rare Fern in cultivation, but well worthy of a place in every collection. Native of the East Indies.

A. macrophyllum.—This beautiful erect-growing Maiden-hair is one of the handsomest and most distinct of the whole genus; the fronds are from twelve to twenty inches high, rising from a creeping rhizome, pinnate; the pinnæ large, when young delicate pink or red, changing to bright green with age; stipes shining black. Native of the West Indies, &c.

A. pedatum.—A handsome and very ornamental species: makes a fine specimen for the greenhouse, and is also perfectly hardy and suitable for the out-door Fernery; the fronds are a foot or more in length, delicate light green in colour, pedate, smooth, and shining, supported upon black stems, which rise from a creeping rhizome. Native of North America.

A. pulverulentum.—A rare and very handsome stove evergreen species; native of tropical America. The fronds are bipinnate, about eighteen inches high; rachis and stipes covered with close rufous hairs; frond, when mature, of a rich glossy green colour. A very distinct and desirable plant.

A. reniforme.—An evergreen greenhouse Fern, found only in Madeira, Teneriffe, and the Azores. The fronds are kidney-shaped, of a bright shining green colour, from

one to three inches in width, and from five to eight inches high, produced from a slightly creeping rhizome. Should be in every collection, and, on account of its distinctness, it contrasts well in a Fern Case.

A. scabrum.—The Silver Maiden-hair Fern—a very compact-growing and beautiful species, with decompose fronds about six or more inches high, and large roundish pinnæ, dusted on both sides with a white farinose powder. An evergreen species, best grown in the greenhouse. Native of Chili.

A. setulosum.—A beautiful little species, easy of cultivation, and very useful for cutting for bouquets, or for making wreaths for ladies' hair. The fronds are bright green in colour, about ten or twelve inches high, bipinnate or tripinnate; the pinnules have a few black hairs upon their upper side. An evergreen species, with a slender creeping rhizome. Native of Norfolk Island and the Fijis.

A. sulphureum.—This beautiful Fern is a native of Chili, and is rather difficult of cultivation; it is, however, well deserving any extra trouble it may cause. The fronds are tripinnate, with small pinnules, when barren, roundish, but the fertile ones slightly cut at the edges. It attains the height of six or eight inches—sometimes more, and is covered on the under side with a more or less bright golden farinose powder.

A. tenerum.—A very fine evergreen stove species, producing fronds from two to four feet in length, tripinnate; stems polished black, rising from a creeping rhizome: makes a fine specimen when well grown, and is very suitable for a Fern Case, or the decoration of the dinner table. Native of the West Indies and tropical America.

A. tinctorum.—This is a beautiful species, and one that

should be in every collection; it is especially adapted for Wardian Cases. The fronds are rosy red in the young state, changing to bright green with age, bipinnate in form, and nine to fifteen inches high. Native of tropical America.

A. trapeziforme.—A fine bold-growing species. This makes a very fine exhibition plant, producing fronds of a bright rich green colour, from two to three feet in length, or more, with very large pinnules; is of easy growth, and should be in every collection. Makes a capital one to plant in the warm Fernery. An evergreen stove plant from the West Indies, &c.

A. villosum.—This is a beautiful Fern, and one that is a general favourite; an evergreen stove species, producing fronds of a rich bright green colour, about eighteen inches high, bipinnate, with shining pinnæ, having the sori in a continuous undivided marginal line; rachis hairy. It is often called *A. varium*. Native of tropical America.

A. Wilsoni.—A very distinct species, and one that requires to be grown in a shady place, with a liberal mixture of broken sandstone in the soil. The fronds are from six to twelve inches long, shining, and dark green in colour, pinnate; the pinnæ large, ovate, and coriaceous; the sori form a continuous line round the margins nearly to the apex. Native of Jamaica.

ALSOPHILA.

The plants comprising this genus are all arborescent kinds, and attain, in some instances, to the height of twenty and thirty feet, or more, in their native countries, where they are to be found inhabiting dark moist glens, producing large crowns of fronds of great magnificence. The genus is to be found both in the tropical and tem-

perate quarters of the globe. The West Indian Islands, tropical America, and Australia have been the chief contributors of the species now in cultivation, and it is curious that only one or two East Indian members of this family should yet grace our gardens. To induce these plants to make fine heads of fronds, an abundant supply of water must be allowed them, both in the soil and by sprinkling the stems with the syringe at short intervals, moderating the supply in the cold days of winter; they must also have good shade, to prevent the sun from burning the fronds as they unfold. The temperature for the tropical kinds should be about 70° to 80° in summer, and 60° to 70° in winter. The temperate species will require little fire heat, but should not be subjected to a lower temperature than from 40° to 45° in winter, though probably some species may be found, upon trial, to be little short of hardy.

A. aculeata.—This is an evergreen stove species; stem from three to six or more feet high, profusely armed with long sharp thorns, which extend in a less degree the entire length of stipes and rachis. The fronds are from four to six feet long, ovate-lanceolate in form, and bipinnate; pinnules sessile, and deeply pinnatifid; colour of fronds dark green. Native of tropical America and the West Indies.

A. armata.—An elegant species, with a slender stem, and very graceful appearance: the fronds are from two to six or more feet long, tripinnate, and a pleasing light green in colour; the stem is small, and densely armed with white spines; the stipes and rachis are also white; the young fronds are densely clothed with large white and light brown chaffy scales. A very distinct free-growing stove evergreen. Native of tropical America.

A. aspera.—This is a very handsome species from the West Indies: the stem is slender, and covered with short stout spines; the fronds reach to some twelve or fourteen feet in length, and are beautifully and gracefully arched, bipinnate, light green in colour, with stipes and rachis covered with short spines: a very handsome Fern for the tropical house.

A. australis.—A noble greenhouse Fern: one of the most magnificent of the genus, rising upon a stem some thirty feet high, and from two to three feet in circumference; the fronds are from five to thirteen feet in length, bipinnate, ovate-lanceolate in form, and light green in colour; stipes and rachis muricate, covered at the base with dark brown chaffy scales. Native of South Australia and Tasmania.

A. Beyrichiana.—This is a fine stove species, with a slender stem. The fronds are bipinnate, bright light green in colour, the crown of plant and stipes very densely covered with long cinnamon coloured hairs. A very distinct and most desirable Fern. Native of Brazil.

A. capensis.—A very fine evergreen greenhouse Fern, rising upon a stem in some instances to the height of fifteen feet, though, perhaps, ten or twelve is a more usual height for it. The fronds are from three to four feet in length, colour bright pale green; they are ovate-lanceolate in form, three times pinnate, and serrated at the margins. One great feature by which this species may be distinguished is the lower pinnæ becoming abortive, and forming short membranaceous segments with a rigid costa; these continue on the base after the frond has fallen away, and present the appearance of a Filmy Fern growing upon it—indeed, this growth has, in mistake, been named *Trichomanes cormophyllum* by one of our great

Fern authorities. A most desirable species, but rare in collections. Native of South Africa.

A. Cooperi.—This fine species many say is synonymous with *A. excelsa*, but it certainly is quite distinct. The crown of the plant, and the stipes, are densely clothed with very dark brown hairs and scales, and the stem is slightly muricate. The fronds are bipinnate or tripinnate, bright green above, slightly glaucous beneath. A very handsome cool house Tree Fern. Native of New South Wales and Queensland.

A. excelsa.—This species is a rapid grower, soon making a fine tall straight stem: it is one of the few Tree Ferns that germinate freely and quickly from spores. The trunk rises to about thirty feet in height, producing a splendid head of large spreading fronds. The crown of the plant is densely covered with large broad light coloured chaffy scales, and the stipes are clothed with them, more or less, throughout their entire length. An evergreen cool house Fern, which may eventually prove sufficiently hardy to live in the open air in many parts of England and Ireland. It is a native of Norfolk Island.

A. gigantea.—An East Indian species. It is very remarkable so few Tree Ferns from that country have been introduced, and that this plant, though so common in many parts of the Madras Presidency, and other parts of India, should still be almost unknown in cultivation in this country. It is a slender-stemmed, large-fronded kind, bipinnate, and bright green in colour. Being found at high elevations, this plant may probably succeed in the cool house, but at present it is considered a stove species.

A. glauca.—A splendid Fern, native of the Philippine Islands, and a sample of the beautiful things we may

expect to get from the Eastern Islands; it is also known as *A. contaminans*. The fronds are bipinnate, from six to twelve feet long, bright glossy green above, and very glaucous beneath; the stem is slender, and is said to attain the height of sixty feet in its native place. The crown and stipes are densely covered with large and long white chaffy scales. A fine species for the tropical Fernery.

A. Leichardtiana.—This is an elegant species, producing fronds some twelve feet or more long, bipinnate, bright green in colour, with brown and black spines on the stipes; the stem is from ten to twenty feet high, and very slender. This is a beautiful temperate house Fern, which should be in every collection where the arborescent kinds are cultivated. It has also been called *A. Macarthuri* and *A. Moorei*. Native of New South Wales.

A. procera.—A very ornamental and distinct Fern, which I have not seen very large at present: the fronds are bipinnate; pinnules dentate, broad, and rich dark shining green in colour; base of stipes muricate and sealy. This is a stove species, from Brazil.

A. pruinata.—A very handsome species. The fronds are bitripinnatifid, from two to five feet long, and glaucous beneath. The plant has somewhat the appearance of *Cyathea dealbata*, but the pinnules are deeply toothed, while in *C. dealbata* they are entire at the margins. A tropical arborescent Fern, with sori like *Polypodium*. Native of tropical America.

A. radens.—This is a slower-growing plant than most of the genus; the fronds are from four to eight feet long, bipinnate, and bright green in colour; the pinnules are broad, and the pinnæ large. An exceedingly handsome stove species, from Brazil.

A. Tenitis.—This fine and beautiful Fern is seldom seen in this country; the largest stem I have seen of it was about four feet high. The fronds are from three to six or more feet long, glabrous, and bipinnate; pinnales lanceolate, about two inches long, and half an inch broad, coriaceous, and bright dark green in colour; sori bearded, forming a continuous line midway between the margin and mid-rib of the pinnule, and dark brown in colour; the stipes and crown of the plant are densely clothed with large mahogany coloured chaffy scales. A handsome little tree, which I hope soon to see more frequent in collections. Native of Brazil.

ANEMIA.

A remarkable and handsome family of dwarf-growing Ferns, having the fertile segments wholly contracted, so as to present the appearance of spikes of flowers. I believe they are all from tropical countries. Some, however, make fine ornaments to the Fern Case, as well as to the Fern house. Most of them are of easy culture, requiring stove heat, and succeed best when potted in fibrous peat and sand. Of this genus some very interesting species have yet to be introduced.

A. adiantifolia.—This pretty Fern grows from six to fifteen inches high; sterile fronds bipinnate, and somewhat triangular in shape; the fertile segments are usually in pairs, wholly covered with sporangia, and rise from the base of the sterile pinnæ to the height of six or more inches. A handsome plant for a Wardian Case, or for decorating the dinner table. Native of Jamaica, &c.

A. cheilanthoides.—Another handsome flowering Fern, the pinnæ finer cut than in the preceding species; sterile fronds about ten inches high, bipinnatifid or tripinnatifid;

pinnæ closely set, and dark green in colour; fertile segments tripartite, in pairs about eight inches high, of a reddish brown colour; rachis and stipes tomentose. A very fine species for the warm house. Native of tropical America.

A. collina.—This is a very fine distinct species; the barren fronds are from eight to twelve inches high, pinnate, pinnæ entire and obtuse, dull green in colour, tomentose: fertile segments in pairs, about nine inches high; rachis covered with ferrugineous hairs. Native of Brazil.

A. Dregeana.—An interesting plant, which grows from eight to twelve inches high: fertile segments in pairs, one often only partially developed; sterile frond pinnate; pinnæ unequal-sided, dark green in colour; rachis tomentose. One of the few Ferns in cultivation from South Africa.

A. hirsuta.—This is an elegant species, producing sterile fronds from six to twelve inches long, pinnate; pinnæ about an inch long, sessile and dentate; the fertile segments in pairs, and rising only about three inches; whole plant hirsute. Native of Brazil.

A. mandioccana.—A fine distinct plant, growing from twelve to fifteen inches high: the sterile frond is pinnate and acuminate; pinnæ an inch and a half long, entire, and somewhat auriculate; the bipartite fertile segments are about six inches in height; rachis densely covered with long reddish brown hairs. Native of Brazil.

ANEMIDICTION.

This family is distinguished from *Anemia* by having the veins reticulated, and, as a rule, they are stronger growers, making highly ornamental plants for the decoration of the

Fern house; these and the *Anemias*, when arranged in a group, present a very handsome and striking appearance.

A. Phyllitidis.—A very handsome Fern: the fronds are from twelve to thirty inches high; the fertile ones, as in *Anemia*, are bipartite and dense; sterile fronds pinnate; pinnæ entire, four inches long and one in breadth, somewhat distant, bearing about ten pairs of pinnæ beside the terminal one: a most desirable plant. Native of tropical America.

A. Phyllitidis fraxinifolium.—This is a very distinct plant, growing from ten to eighteen inches high: fertile segments dense; sterile frond pinnate; pinnæ entire, ovate in shape, about two inches long and one or more broad, and set closely together, having nine pairs of pinnæ in addition to the terminal one. Native of tropical America.

A. Phyllitidis longifolium.—A very fine and handsome plant, growing from fifteen inches to two feet high, often producing three fertile segments; the sterile fronds are pinnate; pinnæ entire, two and a half inches long and two-thirds of an inch broad, sharply acuminate: a handsome plant for the Fernery or a Glass Case. Native of Brazil.

ANGIOPTERIS.

This is a family of gigantic Pseudo-Ferns, but they do not produce stems; their fronds are from six to twenty feet high; the base of the stipes is clubbed, and about six or eight inches in circumference; the fronds are very broad, and give to a Fernery of sufficient size to accommodate them a splendid tropical appearance: being natives of swampy places, they must have a very liberal supply of water. The soil best adapted for their growth

is a mixture of strong loam and peat, with some river sand, having the pots thoroughly drained.

A. erecta.—This is the species to be most frequently seen in collections, and the largest plants of the family in cultivation are this kind: it is a magnificent plant, producing large bipinnate fronds, with bright shining green pinnules from three to six inches long. A noble plant for the tropical Fernery, where there is room for the fronds to expand their beauty. Native of Ceylon and the Pacific Islands.

A. prurioides.—A very fine plant, resembling the previous species in general appearance: pinnules somewhat larger, and, on the under side, of a fine bluish white colour; requires exactly the same treatment as *erecta*, and, like that species, is a noble object for the Fernery. Native of Java.

ASPIDIUM.

A family of erect-growing Ferns, with broad massive fronds, varying in size from one to four or more feet high. They are very effective plants in a fernery, and are of easy growth, and rather accommodating with respect to temperature; they should be grown in peat and sand, with a portion of loam. We have no British species—the species once placed in this family having been removed, and the name *Aspidium* confined to those having netted veins, and the indusium orbicular or reniform; those possessing the latter peculiarity are often placed in the genus *Sagenia*.

A. cicutarium.—This plant requires stove temperature. It is a beautiful species, but is not plentiful in collections. The fronds are bipinnatifid, from one to two feet long; pinnæ broad, with the edges crenate, in colour light green. Native of Jamaica.

A. coadunatum.—A fine species, growing from one to nearly four feet high, subpinnatifid, and light green in colour, the pinnæ broad. It will succeed in the temperate house, and make a good species for the Fernery. Native of the East Indies.

A. macrophyllum.—This is a fine species, and one that succeeds well in the temperate house, although it will grow finer in the stove: the fronds are from one to nearly four feet high, pinnate, the terminal pinnæ being broad and decurrent; the basal pair auriculate on the lower margin; colour light green. It is a grand and distinct kind for the Fernery, but requires plenty of space. Native of tropical America.

A. Pica.—This fine species grows from one to two feet in height, a third of which is bare. The fronds are pinnatifid, more or less deeply lobed, six inches in breadth, and bright green in colour; the large and dense sori are dark brown, and very conspicuous on the under side, and the stem is ebony black and shining. It forms a beautiful and very desirable specimen: an evergreen stove Fern. Native of the Mauritius.

A. pteropus.—This plant is subject to much variation between the young seedling and its perfect fruiting state. When young, the fronds are simple and entire; it then becomes once divided, and at its maturity is a large frond, from one to two feet high, deeply pinnatifid, having usually from three to four pairs of pinnæ, broad and dark green in colour. A distinct and handsome plant, deserving general cultivation. An evergreen stove Fern, from Ceylon.

A. trifoliatum.—A fine free-growing Fern, and one that should be in every Fern house. The fronds are trifoliate or pinnate, the lower pair of pinnæ lobed on both

margins, and all deeply erenate; they are from ten to twenty inches long, and bright green in colour. This Fern will succeed in either the temperate house or stove. Native of tropical America.

ASPLENIUM.

Of this extensive genus we have a great many species in cultivation, but I have only enumerated some of the most distinct and beautiful. They are found in every country, and vary from a few inches to several feet in height. Some species of this family have an extensive range: I have myself seen specimens of our British *A. Trichomanes* from the East Indies, North America, and Japan. They are highly ornamental plants, many being suitable for Wardian Cases, or their ent fronds for bouquets, while some are pendulous in habit, making them splendid objects for suspending in baskets. Nearly all are evergreen species, and some make fine specimens for exhibition purposes. In potting them, good drainage is essential: most of the tropical kinds succeed best grown in peat and sand; some of the ereeping species will do best on sandstone, with a little peat only. This genus is well represented in Britain. The Lady Fern, of which upwards of three hundred and fifty varieties are known and described, is generally referred to *Athyrium*.

A. alatum.—This very handsome species is a native of tropical America. The fronds, when well grown, are a foot or more in length, of a cheerful green colour, and pinnate, with the rachis winged the whole length, and proliferous at the apex. A charming stove evergreen plant, which should be in every collection of choice Ferns. Well adapted for suspending in Baskets.



ASPENIUM ALATUM. *Humb.*

Tropical America.

A. alternans.—An interesting and distinct species from Northern India, which may, in many localities, prove hardy. The fronds, which are pinnatifid, attain the height of some six inches, and resemble those of our British *Ceterach*, but they want the dense squamose covering on the under side. A good kind for the crevices of rocks in the Fern house.

A. appendiculatum.—A handsome greenhouse evergreen Fern, and of easy culture. The fronds are dark green in colour, subtripinnate, and about eighteen inches long, proliferous on the upper surface, the reverse side densely covered with the dark brown sori. It makes a very pretty plant in the cool Fernery. Native of Australia and Tasmania.

A. attenuatum.—This species, though not possessing a very graceful outline, is well worth a place in the collection. It is an evergreen erect-growing greenhouse kind, of easy culture. The fronds, which rise from an erect caudex, are about a foot or more long when well grown, and of a very dark green colour, fleshy in texture, lanceolate, simple, though sometimes pinnate at the base, and proliferous at the apex. Native of New South Wales and Queensland.

A. auritum.—A very beautiful stove evergreen species. The fronds are about twelve or fifteen inches long, tapering to the point, and of a lively light green colour, pinnate in shape, saving the pinnule next the base, which is divided to the bottom and eared. Well adapted for a Glass Case or Shade. Native of South America and the West Indies.

A. Belangeri.—A very handsome species, and one that should be in all collections, great or small. It produces its elegant feather-like fronds from an erect caudex; they are of a pleasing deep green colour, and about eighteen

inches long, bipinnate, and proliferous. It is an evergreen stove plant, not requiring any special care in its cultivation. Native of Java.

A. bifidum.—A very pretty species, with a short decumbent rhizome, covered with dark chaffy scales; the fronds are from ten to eighteen inches in height, erect, tripinnate, and lanceolate in form, with the apex of each pinnule cleft or bifid, and dark green in colour. This is a very handsome plant either grown in the open Fernery or in a pot; it also is one of the very best in a Wardian Case. An evergreen stove Fern, from the Mauritius.

A. brachypterum.—This species, though now cultivated in our gardens for some years, has not become so universally distributed as it deserves. It is a dwarf bipinnate evergreen stove Fern, producing horizontal fronds from six inches to a foot long from an upright caudex. The fact of its being a native of West Africa has caused it to be kept too hot, I think. The finest specimens that I ever saw of this plant were from the Cameroons Mountains at Fernando Po, gathered at a good elevation: this should be a lesson to us to give it a lower temperature. It will prove a beautiful kind for a Wardian Case.

A. bulbiferum.—This handsome plant is of rapid growth and easy culture; the fronds are eighteen inches or more in length, proliferous, and made pendulous by the great number of young plants upon them; they are produced from a scaly creeping rhizome, and are pale green in colour. An evergreen plant, suitable for the cool house. Native of New Zealand.

A. caudatum.—A noble-growing somewhat pendulous species, making fronds from one to three feet in length and eight inches in breadth, and useful for planting on

rock-work in the Fern house. An evergreen stove Fern, producing its pinnate fronds from a creeping rhizome, the long pinnae being attenuated towards their apices; sori very conspicuous, making two lines parallel to and close beside the mid-rib. Native of the East Indies, &c.

A. cicutarium.—A very handsome delicate green stove Fern. The fronds are subtripinnate, produced from an upright caudex, and about ten or twelve inches long; it requires some care in its management, being rather delicate in constitution. Native of tropical America.

A. compressum.—This is a robust-growing evergreen Fern, with thick fleshy pinnate fronds, the pinnae bearing young plants upon their upper surface. The fronds are from one to two feet high, rising from an erect scaly caudex. Native of St. Helena, and thrives best in the greenhouse.

A. dimidiatum.—This is a very handsome evergreen stove species. The fronds are pinnate, about a foot long; pinnae large, wedge-shaped at the base, and deeply incised along the margins. It is well worth a place in every collection, on account of the peculiar shape of its pinnae. Native of the West Indies and Venezuela.

A. dimorphum.—This elegant plant is often called *A. diversifolium*, a name very applicable to it, as the barren and fertile fronds, or portions of fronds, are so widely different; that name is, however, pre-occupied by another plant not yet introduced to our gardens. In the present species, the barren fronds are bipinnate, with broad pinnae, and the fertile fronds are very finely divided and tripinnate, shining bright green in colour; they are from one to two feet in height, produced from a creeping rhizome. Sometimes a portion of the frond will be partly barren, while other portions are

fertile. An evergreen species, well adapted for the cool Fernery or Wardian Case. Native of Norfolk Island.

A. erectum.—This charming species somewhat resembles a robust form of *A. formosum*, but is perfectly distinct from that plant. The fronds are pinnate and linear-lanceolate, becoming pointed at the apex; sori bold, two on each pinnae; the rachis and stipes black; caudex erect, producing fronds eight to twelve inches high, of a lively green. Native of the Cape of Good Hope.

A. Fabianum.—A fine ornamental species, beautifully adapted for dinner-table decoration, or for vases, and also for the Wardian Case; the fronds are gracefully arched, and every pinnae becomes beautifully pendulous, from the weight of the mass of young plants borne upon it. The fronds grow from ten to twenty-four inches in length, and are a very rich dark green in colour. An evergreen viviparous stove plant, from the Mauritius, &c.

A. flabellifolium.—An extremely pretty slender-growing species, well adapted for growing in baskets. It makes fronds from twelve to eighteen inches long, pinnate and proliferous at the apex; pinnae fan-shaped, with bold reddish brown sori on the under side, bright green above; it is so distinct from everything else, that it should find a place in every collection. Native of New Holland.

A. flaccidum.—This beautiful Fern is well suited for Baskets, its long pendulous fronds giving it a charming appearance. The fronds are bipinnate, leathery, from two to three or more feet in length, of a rich deep green colour. An evergreen cool house species, from Tasmania and New Zealand.

A. formosum.—This elegant species is still uncommon in cultivation, though it would seem to be widely distributed

in a wild state. The fronds are pinnate; pinnæ deeply cut, and opposite; fronds from ten to eighteen inches long, and from one to one and a half inches wide; stipes shining black. The fronds rise from an erect caudex, curving outwardly, as in *Thamnopteris Nidus*: an ever-green stove Fern, and a very pretty kind for in-door rock-work. Native of tropical America, &c.

A. Hemionitis.—A very handsome and distinct ever-green greenhouse Fern, generally known under the name of *A. palmatum*. The fronds rise from a creeping rhizome, and are from six to ten inches high, palmate in form, cordate at the base, and light green in colour; very distinct for the cool house, and suitable for planting in the clefts of rock-work. Native of North Africa, Madeira, and Teneriffe.

A. Hemionitis cristatum.—A garden variety, resembling the former in every respect, with the addition of a large tuft or crest at the apex of the frond. A very handsome and distinct form; like the former, it is a good addition for the greenhouse Fernery.

A. Hookerianum.—A handsome dwarf-growing species. It makes a charming little object planted in a cleft of rock in the cool Fernery, and is also well adapted for a prominent position in a Wardian Case; it grows from two to six inches high, pinnate; pinnæ rounded, in some cases lobed, bright dark green in colour, with prominent dark brown sori on the under side. An evergreen species, from New Zealand.

A. lucidum.—A fine large free-growing Fern, which should be in every collection. The fronds rise from a creeping scaly rhizome, pinnate, and varying from one to three or four feet in length, according to the pot room allowed for its development; pinnæ large, oblong, and

coriaceous. The beautiful pendulous habit and shining green fronds of this species render it a striking addition to the Fernery. Native of New Zealand.

A. monanthemum.—A very handsome small-growing greenhouse evergreen Fern. The fronds, when successfully grown, are about a foot long, pinnate, of a lively green colour, erect, and about an inch wide. Native of temperate America, South Africa, and Madeira.

A. myriophyllum.—This very elegant plant cannot be described so as to do it justice. The fronds are from six to twenty inches long, tripinnate, lanceolate, and proliferous at the apex; the pinnules are very small, and dark green in colour. But to obtain a proper idea of its exquisite beauty, I must refer the reader to the illustration. Native of Mexico, &c.

A. nitens.—This is a noble-growing plant. Fronds pinnate, and from twelve to eighteen inches long; pinnæ large, wedge-shaped at the base, with large linear sori running parallel with the mid-rib. This is an evergreen stove Fern, from the Mauritius.

A. obtusatum.—A free-growing greenhouse Fern, with thick, fleshy, glabrous fronds, which are from eight inches to a foot high, and pinnately divided; pinnæ obtuse, with bold sori upon the under surface. An evergreen creeping species. Native of Tasmania and New Zealand.

A. obtusilobum.—A pretty dwarf trailing species, proliferous at the apex, rooting and making a dense compact mass. The fronds are pinnate, from three to six inches long; pinnæ deeply cut and cuneiform, bright dark green in colour. This forms a beautiful little specimen in a Wardian Case. An evergreen Fern, from the Fiji Islands.

A. Petrarchæ.—This is a very elegant little plant, and very delicate in constitution. It should be planted in



ASPENIUM MYRIOPHYLLUM. *Presl.*

West Indies.

the cleft of a rock in the cool Fernery, and is an evergreen species, producing fronds from three to six inches in length, pinnate, and light green in colour. Should be in every collection. Native of the south of France.

A. polyodon.—This is a very handsome species from New Zealand, producing pinnate fronds, from one to two feet long, and lanceolate in form, pendulous, and of a rich dark green colour. To grow this plant well, it requires to be kept warmer than most of the New Zealand species.

A. præmorsum.—A very handsome Fern, and a general favourite, though it varies very much in its appearance, and produces several handsome varieties which are constant in cultivation. The fronds are from one to two or more feet long, produced from a creeping rhizome; they are bipinnate in shape, with long crose pinnae, in some varieties much broader than others. The rachis and stipes are very scaly; the fronds are pendulous, and dark green in colour. Native of Mauritius, tropical America, and Madeira.

A. rachirhizon.—This is a charming plant when due attention is given to its cultivation. The fronds are often eighteen inches in length, bipinnate or tripinnate; pinnae finely divided; the apex of the frond lengthened out and viviparous, pendulous; and the rachis and stipes shining black. An evergreen stove Fern; well adapted for a basket. Native of tropical America.

A. rhizophorum.—A very handsome pendulous species, not requiring any particular care in its cultivation. The fronds are of a light green colour, a foot or more in length, shining, bipinnatifid, and somewhat triangular in form, having the apex lengthened out into a tail, bearing a young plant on the end: an evergreen stove plant. This

is another beautiful one for suspending from the roof in a Basket. Native of Venezuela and Jamaica.

A. serra.—The noblest-growing species in this group, producing, from a stout creeping rhizome, beautifully arched fronds upwards of two feet in length, dark green in colour, and pinnate in form; pinnæ large, deeply serrated on the margins, somewhat lanceolate; the sori linear, lying at an acute angle with the mid-rib. An evergreen stove Fern, and a grand one for planting in the Fernery. Native of Brazil.

A. viviparum.—A very distinct and elegant Fern. The fronds are about a foot in length, very finely cut, tripinnate, and densely loaded upon the upper surface with young plants, which should be fastened down to the soil to allow them to root, if the desire is to increase the stock. It makes a very pretty object for a Wardian Case. Native of the Mauritius.

ATHYRIUM.

A handsome genus of Ferns, distinguished from *Asplenium* by their deciduous fronds, and more or less hippoerepiform sori. It is well represented by our native Lady Fern.

A. Goringianum pictum.—This is a remarkably pretty Fern, and, I believe, perfectly hardy; one of our recent acquisitions from Japan. The fronds are from six to eighteen inches long, pendulous, somewhat lanceolate in form; rachis reddish, with the pinnæ next it on each side variegated, forming a central grey band throughout its entire length.

BALANTHUM.

A genus which includes only one species, but that is a very fine one. It is not strictly a Tree Fern, though it

has been referred to in a previous chapter as such, but, being a large-growing plant, with stipes stouter than many stems of the small arborescent species, I have thought it right to include it in that place, more especially as it associates so well with them. The sori on the fertile frond are very bold and distinct, giving the plant a grand and massive appearance. Being found growing at considerable elevations, it succeeds well in the cool house; it should be potted in a mixture of loam, peat, and sand, and liberally supplied with water.

B. Culcita.—A noble plant, well deserving a place in every collection; the fronds grow from two to five feet in height, tripinnate, and deltoid in shape, bright shining dark green in colour, and produced from a stout, densely hairy, decumbent stem. It is a conspicuous-looking, grand Fern, from Madeira and the Azores.

BLECHNUM.

This family is nearly allied to *Lomaria*; most of the species are handsome-growing plants, and several of the dwarf kinds succeed admirably in Wardian Cases. Many of them are good kinds for the cool house, having stont fronds, and robust constitutions.

B. brasiliense.—A noble-growing kind, making fronds from one to four feet in length, and, as it attains age, forming a stem some two feet in height; the fronds are lanceolate in form, pinnate, the pinnæ being decurrent, and from five to seven inches in length. A very distinct species for the tropical Fernery. An evergreen stove plant, from Brazil.

B. cartilagineum.—This superb species should be in every collection: it attains the height of four feet or more, and forms a short stem with age; the crown of the

plant and stipes are clothed with long black chaffy scales; fronds pinnate; pinnae sessile, ovate-lanceolate in form, a rich bright green in colour: a highly decorative plant for the cool house. Native of Australia.

B. gracile.—A distinct and pretty species, of easy culture. The fronds are about a foot long, pinnate; the pinnae a rich deep green colour, and the rachis red. An evergreen species. Native of Brazil.

B. Lanceola.—A dwarf-growing kind, from Brazil, which makes a beautiful little specimen in a Glass Case. The fronds are simple, about six inches long, bright dark green on the upper side, and the brown sori on the under side forming a broad stripe up the centre.

B. longifolium.—A very handsome kind, which succeeds well in similar situations that suit *B. Lanceola*. The fronds are about six inches long, and look like the simple frond of *Lanceola*, with a pair of pinnae added to the base. It is a good plant for rock-work. Native of Trinidad.

B. nitidum contractum.—A beautiful species, with an erect caudex. The fronds are from one to two feet in length, pinnate; pinnae linear and acuminate, serrate on the margins, and shining dark green in colour; when young they are bright red, and have a remarkably handsome and pleasing appearance. An evergreen stove Fern, worthy of general cultivation. Native of the Philippine Islands.

B. occidentale.—An evergreen species of easy growth, admirably adapted for a Fern Case, and for mixing with cut flowers, its elegant fronds living a long time in water. The plant grows about eighteen inches high, somewhat pendulous, pinnate, and lanceolate; pinnae sessile, auriculate on the upper margin, and bright rich green in colour. Native of the West Indies.

B. occidentale multifidum.—This beautiful variety is, apparently, very rare; it grows about a foot high: fronds pinnate, the pinnæ being bifid and trifid at the apex, giving it a very handsome appearance. Resembling, in other respects, the species, I am not aware if it perpetuates its form from spores. Introduced from Dominica.

B. orientale.—This is a rare species, and one of the finest of the genus; it is a stove kind, native of the East Indies and Malay Islands. The fronds, in large plants, attain the length of three feet, and are pinnate; colour light green. A desirable species for a choice collection.

B. polypodioides.—An evergreen species, that will succeed either in a Glass Case or greenhouse during summer. The fronds are from ten to twenty inches long, pinnatifid, and of a rich dark green colour; when young, they are a beautiful pink, changing to green as they reach maturity. It is a capital Fern for Baskets. Native of Brazil.

B. serrulatum.—A fine species, but rare in cultivation. The fronds are pinnate, and about twenty inches long; pinnæ toothed at the edges, of a bright green colour. An evergreen kind, from tropical America.

BOTRYCHIUM.

This is a very interesting genus, of which we have a familiar example in our common Moonwort (*B. Lunaria*). They are all deciduous, and should be planted in some nook where they will not be disturbed and not get dry when at rest, or death will assuredly ensue. If properly treated, their fruiting fronds will have a pleasing appear-

ance among other Ferns in the summer time. I have found them succeed best in a mixture of sandy loam with a small portion only of peat, care being taken to keep the drainage in good order.

B. australe.—This fine species is at present rare in cultivation; its fronds rise to the height of twelve or fifteen inches; sterile segments bipinnate or tripinnate compound, serrate on the margins, and the fertile ones paniculate; colour bright green. It is a very handsome finely divided deciduous plant. With this, and all the family, care must be taken when they are at rest to keep them from getting dry, or they will perish; this drying up is one cause why we so seldom see these plants in cultivation. Native of New Holland.

B. daucifolium.—A handsome strong-growing species, reaching the height of ten or fifteen inches: sterile fronds bipinnately or tripinnately decomposed; segments broad and obtuse, dark green in colour, with the margins slightly serrate, the fertile segments paniculate, resembling those of *Anemia* in general appearance. A deciduous stove species, from Ceylon.

B. lunarioides.—This is another species, similar in general outline to the preceding; the segments are oblique, and the fronds are of a dark green colour. It is a hardy plant, but succeeds best, and is also seen to much better advantage, in the cool Fern house. Native of North America.

B. virginicum.—This is a widely distributed kind, being found growing throughout America, India, and various other places. In Canada it is called the Rattlesnake Fern; it has large dark green decomposed sterile fronds, and a panicle of fertile segments. As well as the preceding, this plant is perfectly hardy, but is more in-

teresting, and can be preserved better when dormant, if kept in the cool Fernery.

BRAINEA.

A very curious and interesting genus of dwarf-growing Tree Ferns.

B. insignis.—This very handsome Fern was originally discovered and brought home by Mr. Braine from Hong Kong, and was thought to be peculiar to that spot for a long time; it has, however, since been found in Khasia, these being the only two places at present known where it exists in a wild state. It makes a stem from two to four feet high, and from twelve to twenty inches in circumference. The fronds are from one to three feet long, pinnate; pinnæ linear-lanceolate in shape; colour dark green on the upper, and pale on the under, sides. This would form a fine object on the summit of some projecting rock near the water, its fine drooping fronds making it a species of great beauty. An evergreen stove species, but rare in cultivation.

CALLIPTERIS.

A genus of large-growing and very ornamental Ferns, well deserving cultivation in a fernery of good dimensions, but not suitable for one of limited extent. They differ from *Diplazium* in having netted veins. Loam, peat, and sand suits them well.

C. esculenta.—This Fern is one that enjoys a multiplicity of names. It rises upon a slender stem, and produces long fine arched fronds, which are from one to three feet long, bipinnate, and light green in colour. It is a very puzzling plant to the uninitiated, as the fronds frequently bear

sori while in the simply pinnate condition. Native of the East Indies, &c.

C. prolifera.—A fine ornamental species, growing from one to three feet high. The fronds are pinnate; pinnæ eight inches long, and upwards of two broad, shining dark green in colour, the sori on the under side covering all the veins, giving the plant a very handsome and interesting appearance. Native of the East Indies.

CAMPYLONEURON.

This genus has been divided from the *Polypodiums* on account of its anastomosing veins, and having biserial sori. Though most of them have simple entire fronds, they are very handsome, and make an agreeable and effective contrast in the Fernery, for I think it a mistake on the part of Fern growers to discard all but those with finely cut foliage. These plants are of easy culture, and very accommodating in respect to temperature. They succeed well in a mixture of loam and peat, with the addition of a little sand.

C. angustifolium.—Fronds produced from a creeping rhizome, and from ten to twenty inches long, simple, entire, widest in the middle, and dark green in colour. A very interesting species, well deserving a place in every Fernery, for the contrast it makes when mixed with others. Native of tropical America.

C. decurrens.—This is a fine Fern, rendered more remarkable by the distinctness of its venation. Fronds from twelve to thirty inches high, pinnate; pinnæ four to eight inches long, lanceolate in form, and winged to, and decurrent with, the base; pale green in colour, with darker markings. A desirable evergreen species, from Brazil.

C. Phyllitidis.—A fine strong-growing species, with erect, glabrous, coriaceous, simple fronds, light green in colour, and from one to two or more feet long. A very free-growing, desirable, bold Fern. Native of tropical America.

C. repens.—This is a distinct and pretty Fern, and of easy culture. The fronds, which rise from a slender, scaly, creeping rhizome, are simple, entire, somewhat lanceolate in shape, dark green in colour, and from ten to fifteen inches in length. An evergreen species, and one which succeeds well in a Glass Case. Native of the West Indies.

C. rigidum.—Another handsome simple-fronded species. The fronds are very thick and fleshy, linear-lanceolate in form, from eight to twenty inches high, and about half an inch or more in width; bright shining dark green in colour, with conspicuous dark brown sori. A very distinct and desirable Fern, from tropical America.

CERATOPTERIS.

C. thalictroides.—This very curious plant is not inaptly called the Floating Stag's-horn Fern, in reference to its habitat and its forked fronds, from which latter the generic name has been derived. It is an aquatic, and for that reason in particular I have introduced it here, as it makes a very handsome plant when grown in water. The fertile and barren fronds are distinct, the former being decomposed, erect, and from one to three feet in height; segments forked and linear; the sterile are bipinnatifid, from one to two feet in length, and prostrate: the whole plant viviparous, and light green in colour. As this is an annual plant, the spores must be preserved and sown, early in spring, in some very

moist loam ; they germinate and grow rapidly if plunged in water in the Fernery. Young plants may also be reared from the proliferous buds, by pegging the sterile fronds on to a surface of moist earth. An annual stove Fern, from the Tropics.

CHEILANTHES.

The species of this most elegant group of Ferns are frequently killed with kindness, or what is considered kindness, by many people. They are principally from tropical countries, but grow mostly at great elevations, and are generally found in the crevices of rocks, where they get an abundance of water ; but hanging down, as they mostly do, and having in most instances a dense coating of curious and beautiful scales, it is at once thrown off without the fronds becoming wet. In cultivation they are frequently syringed, and potted in deep fine soil, and kept in the stove. I have always found them succeed best without wetting the fronds, keeping them in a cool house, potted in good fibry peat and sand, with an equal part of sandstone broken into pieces about the size of a walnut, and elevating the crowns above the rim of the pot whenever they have been repotted. The species in cultivation are all exceedingly beautiful, and are well deserving general attention. Many of them succeed well in a Wardian Case, and form little specimens of exquisite beauty ; others are equally well suited for suspending in Baskets, where they display their elegant fronds to great advantage.

C. alabamensis.—A beautiful dwarf-growing greenhouse evergreen species ; the fronds bipinnate, about six inches in length, and rich dark green in colour, rising from a creeping rhizome. A very pretty plant for Wardian



CHEILANTHES ELEGANS. *Desv.*

Tropical America.

Cases or for bouquets. Native of the Southern United States.

C. argentea.—This species is a universal favourite. The fronds are of a bright dark green colour on the upper side, and beneath they are covered with a white farinose powder, to which the sori, forming a black marginal line all round the frond, is a beautiful contrast. It is an evergreen species, and should be grown in a moist shady place in the cool Fernery. The fronds are from two to six inches high, triangular in form, tripartite and shining. Native of Siberia and Japan.

C. Borsigiana.—Another charming little plant, resembling the former in every respect, saving that it grows a little larger, and the under surface is copiously covered with a rich golden farinose powder. It requires to be grown in a shady moist situation, but as near the glass as possible. This plant is also known under the names of *Pteris* and *Nothochlaena sulphurea*. An evergreen stove species, from Peru.

C. capensis.—An interesting and beautiful species, somewhat rare in cultivation. The fronds are bipinnate; pinnae sessile, ovate, crenate round the edges, smooth and dark green in colour. A truly superb little Fern of dwarf habit, thriving well in the cool house, and deserving general cultivation. It is also well adapted for a Fern Case. Native of South Africa.

C. elegans.—This is a very delicate-looking, but handsome, species. It is generally considered a stove Fern. I have, however, found it—and many others of this section, which some name *Myriopteris*—to succeed far better in a cool house, potting them among sandstone and rough peat, giving plenty of water at the roots, but never allowing any to remain on the foliage. The fronds

vary from six to twenty inches in length, and are tripinnate; pinnules roundish euneiform and pocket-shaped when fertile; the stems, and the underside of the whole frond, hirsute. Native of Chili, Peru, and Mexico.

C. farinosa.—A very fine species, growing under good treatment to the height of two feet; it is, however, more often seen about one foot long. The fronds are densely coated with a white farinose powder on the under side, while on the upper side they are dark green. They are somewhat triangular in shape, and bipinnatifid. Native of India and Arabia.

C. fragrans.—This elegant little Fern should be in every collection. The fronds are from four to eight inches high, light cheerful green in colour, and bipinnate; pinnæ obtuse, the basal ones being pinnatifid; stipes and rachis hirsute. The whole plant emits a very agreeable perfume when handled, and the fronds retain the same for a long time when gathered and dried in a book. It succeeds well in the cool house, and is a perfect little gem for a Wardian Case. Native of South Europe, Madeira, and Algeria.

C. frigida.—For this species the treatment above described for *elegans* may be recommended. It is a very handsome plant, having the creeping rhizome densely covered with brown chaffy scales; the stems are brown, and very hairy; the fronds are from twelve to twenty inches long, dark green in colour on the upper side, and on the under side covered with long hairs, tripinnate, and in shape generally triangular, though it is very variable. An evergreen species. Native of tropical America.

C. hirta.—This is a free-growing kind, and ranks amongst the prettiest in the genus. It is a greenhouse evergreen, erect in habit, producing fronds from ten to

eighteen inches in length, subtripinnate, very hairy, and pale green in colour. There are several varieties of this plant—one in particular, called *Ellisiana*, has the fronds very broad, and makes a beautiful specimen. Native of South Africa.

C. microphylla.—A very good species, and not difficult to grow into a handsome plant; it also makes a pretty ornament in a Wardian Case. The fronds rise from a creeping rhizome, and are lanceolate and bipinnate, attaining the height of twelve or eighteen inches. The same remarks apply to this as to *C. elegans*. An evergreen Fern. Native of tropical America.

C. multifida.—This is a distinct and pretty species. The fronds are supported upon very thick stems (for the size of the plant), and arise from a creeping rhizome to the height of six or eight inches; dark green in colour, somewhat triangular in form, and four times pinnate. An evergreen species, from the Cape of Good Hope and St. Helena.

C. pteroides.—A strong-growing, handsome plant, and though an old inhabitant of our gardens, still scarce. It is very unlike a *Cheilanthes* in appearance, and has been named at various times *Adiantum*, *Adiantopsis*, *Cassebeera*, and *Pteris*: I believe, however, its proper place is with this genus. The fronds rise from a creeping rhizome, and are about twelve or eighteen inches in length, tripinnate; pinnæ cordate, and of a good substance, bright green in colour; the sori is reddish brown, and makes a broad continuous band round the margin of the under side of the pinnæ. An evergreen greenhouse species, which should be in every collection. Native of South Africa.

C. pulveracea.—This very handsome plant is an ever-

green cool house species. It resembles *C. farinosa* somewhat in general appearance. The fronds are bipinnatifid, from six to eighteen inches long, deep green in colour, covered with a white farinose powder beneath; some varieties have a sprinkling of the farinose powder on the upper side also. A very desirable Fern. Native of the high regions of Mexico.

C. radiata.—A most beautiful species, with shining black stems, and bright dark green fronds, which vary in length from six to twelve or more inches, and six or eight in diameter. They are produced from an erect caudex; the pinnæ all spring from one point, and are pinnate. Sometimes there are five, and at others seven, branches, producing a radiating frond: it is known to some by the name of *Adiantopsis*. An evergreen stove plant. Native of Peru.

C. spectabilis.—This species is well adapted for suspending in Baskets, making, as it does, fronds from two to four feet long. It is an evergreen species, growing strongest in the stove, but thrives and makes a pretty Basket plant also in the cool Fernery, or it may be planted out so that its fronds hang over a ledge of rock, where it forms a charming object. The fronds are produced from an erect caudex, tripinnate; stipes and rachis jet black and slightly hirsute. Native of the Organ Mountains and various other parts of Brazil.

C. tenuifolia.—An exceedingly handsome species. The fronds are produced from a creeping rhizome, and vary in length from ten to twenty inches, somewhat ovate in outline, and tripinnate, erect in habit, and bright light green in colour. A beautiful Fern for the cool house, partially deciduous. Native of the East Indies, Australia, and New Zealand.

C. viscosa.—This is a very distinct plant in the outline of the fronds; it is generally grown in the stove, but thrives admirably under the treatment given for *C. elegans*. The fronds rise from a creeping rhizome, triangular in shape, tripinnate, and pale green in colour, covered all over with viscid hairs. Native of tropical America.

CIBOTIUM.

This is a small distinct genus of robust-growing and highly ornamental plants; and, though generally considered Tree Ferns, some species have a decumbent rhizome, of which the *Barometz*, or Vegetable Lamb, is a good example. They are easy of culture, and most of them will succeed in the cool Fernery; for exhibition purposes, also, these plants are admirably adapted. In potting, the decumbent-growing ones should be elevated a little above the rim of the pot; by so doing, in the case of the first species given below, a lamb may be grown in a few years. The soil best adapted for them is good fibrous peat and sand.

C. Barometz.—This is the plant of which such marvellous tales were told by the early Asiatic travellers. It was described as an animal which grew from the soil, and was clothed with wool like a lamb; being fixed to the spot, it was unable to roam about, but had the power of turning round, and when it had consumed all the herbage within its reach it died: this, and many more fabulous stories, has led to its being called the Vegetable Lamb. The fronds rise from a stout, densely hairy, and decumbent rhizome, and are five to eight feet long, somewhat triangular in shape, and bipinnate; pinnae deeply pinnatifid, and shining dark green in colour above, glau-

eous beneath; stipes and rachis more or less hirsute throughout their entire length. An evergreen cool house species. Native of China, &c.

C. Menziesi.—A handsome Fern, but at present very rare in cultivation: it is erect in growth, but whether it will form a large stem I am unable to say. The fronds are bipinnate; pinnæ long and acuminate; pinnules broad and obtusely lobed, and bright dark green in colour; stipes clothed with short woolly-looking dun coloured scales. An evergreen stove species. Native of the Sandwich Islands.

C. regale.—Of this plant I can say but little, never having seen it more than once or twice: it is a somewhat recent introduction from Mexico, bearing some resemblance to *C. Schiedeii*, with its long light green arching fronds; the crown is densely clothed with hairs, and it will probably form a stem more rapidly than some of the species belonging to this genus. A beautiful and desirable plant for the cool house.

C. Schiedeii.—This beautiful and elegant Fern is a very distinct and desirable species. The stem is upright, and is said to attain the height of fifteen feet: if so, I think stems so high must be very old indeed, for in cultivation it is very slow in forming a trunk, the largest I ever saw being under two feet in height. It is a free-growing plant, producing large spreading fronds from six to fifteen feet long and pendulous, bipinnate, the pinnules lobed; colour pale green above, very glaucous beneath; the sori are situated on the margins, and are enclosed in little caskets; stipes and rachis hirsute; the crown is also densely clothed with long silky chestnut coloured hairs. An evergreen greenhouse plant from Mexico.

CIONIDIUM.

This genus, though only possessing a single species, has been a subject of some dispute with respect to its generic name. That which I have adopted is Mr. Moore's, of Chelsea, and I believe it is named in honour of Mr. C. Moore, of Sydney, New South Wales. It is called by some authors *Deparia*, and by others *Trichiocarpa*. It is a distinct and very handsome Fern, but is apparently rare and little known. The sori, which stand out beyond the margins upon little thread-like footstalks, give a singular and unique appearance to the whole plant. It requires thorough drainage, and should be potted in good fibrous peat and silver sand.

C. Moorei.—The fronds of this beautiful and rare Fern are from six to eighteen inches high, bi or tripinnatifid, and somewhat triangular in shape; pinnae distant, lower pair pinnate, upper ones decurrent; the sori are situated upon the apex of the veins, which are exerted beyond the margins of the frond; colour rich dark green, very compact in habit. An evergreen species, requiring the heat of the tropical house. A native of New Caledonia.

CYATHEA.

A large family of Tree Ferns, widely distributed over the surface of the globe, some species of which form slender stems a few feet high, whilst others tower aloft some thirty feet or more. The trunks of the tropical kinds are mostly slender in proportion to their height, and in many instances densely armed with stout spines, whilst those from more temperate regions have much stouter stems, and are nearly or quite destitute of these spines. They are distinguished from *Alsophila* by having

a perfect calyceiform indusium, while in that genus the indusium, when present, is represented by a small scale, but it is more frequently entirely wanting. They are of easy culture. The directions given for *Alsophila* will suit them in every respect. In the group of Tree Ferns given with the genus *Dicksonia*, a sketch of *Cyathea dealbata* will be seen on the left hand side of the illustration.

C. aculeata.—This very handsome Fern requires the heat of the tropical house. It makes a tall somewhat slender stem, with large and broad fronds, of a rich dark green colour; the stipes are covered with short spines, and it also has the peculiarity of developing a pair of small pinnæ near the base. A very ornamental species. Native of the West Indies.

C. arborea.—A very distinct and handsome species, and one that makes its stem rather rapidly, growing from twenty to thirty feet in height. The fronds are from six to twelve feet in length, and are bipinnate or tripinnate; pinnæ fifteen to twenty inches long, and the stipes and rachis densely covered with large white chaffy scales and hairs. An elegant warm house Fern, making a splendid crown of fronds. Native of Jamaica, &c.

C. canaliculata.—This is a beautiful Fern. The stems, which are very dark in colour, rise from ten to fifteen feet in height; the fronds are bipinnate and leathery, from four to ten feet in length; the pinnæ about eight inches long and two wide, of a dark green colour above, and paler below; and the stipes are densely covered with long black chaffy scales. A very desirable and handsome plant. Native of the Mauritius.

C. dealbata.—The most beautiful species in the present genus. The stem attains a height of from ten to twenty feet, and produces fronds from ten to twelve feet in

length, forming a handsome crown on the top of the stem, which has gained for this plant the name of the Silver Tree Fern; they are of a beautiful silvery white beneath, a splendid Fern, succeeding well in the cool Fernery. Native of New Zealand.

C. Dregei.—One of the few Ferns from South Africa which are in cultivation. I have not seen this, except in a young state, and am unable to say to what size it will attain. The crown and base of the fronds are clothed with bright brown scales, and the fronds are of a light green colour. It is peculiar in having a pair of small pinnæ developed close to the crown, above which the stipes are bare for some distance. This will no doubt prove a valuable addition to our temperate species.

C. excelsa.—A very distinct and handsome Fern, rising upon a stem from twelve to twenty feet high. The fronds form a beautiful head, somewhat arched, and are tripinnate; the pinnæ are upwards of two feet in length, and of a very dark green colour. It requires to be kept in the stove, being a native of the Mauritius. This must not be mistaken for *Alsophila excelsa*, which is a greenhouse species.

C. horrida.—This is a very rare Fern in cultivation. I have not seen it larger than about four feet in height; the stipes thickly covered with light brown pubescence, through which large stout black thorns protrude nearly a quarter of an inch in length, and having somewhat the appearance of *Cratægus* thorns; the under side of the rachis, as far as the points of the pinnæ, is also armed with long straight spines, often in pairs. The fronds are of a very dark green colour. It will make a very handsome species. Native of Martinique.

C. Imrayana.—A distinct and handsome Fern: the stem is slender and prickly, and the base of the stipes bend inwards, almost covering in the crown; fronds bitripinnate, from three to ten feet or more long, and bright light green in colour; stipes muricate, and clothed at the base with large bright brown chaffy scales. A very desirable species, from the West Indies.

C. medullaris.—This is a magnificent and gigantic species, not to be mistaken. It rises upon a stem upwards of thirty feet in height, producing fronds ten to fifteen feet in length; the young fronds, before they are fully unrolled, and the base of the fronds, are densely covered with long black chaffy scaly hairs. Native of New Zealand and the Pacific Isles.

C. princeps.—This magnificent species rapidly makes a stout stem. The fronds are tripinnate, from three to twelve feet in length, beautifully arched, and bright light green in colour; the crown of the plant, stipes, and rachis are all densely covered with large light brown or white chaffy hairs or scales. An elegant cool house Fern, which stands in the conservatory here, and thrives well, and should be in every Fern house where space can be allowed for its proper development. Native of Mexico.

C. serra.—A magnificent species, making a stem from ten to thirty feet high, and fronds from six to twelve and fourteen feet long, of a beautiful pleasing light green colour. The stipes are stout, muricate, and, together with the crown, densely covered with large fawn-coloured chaffy scales, which are, in many instances, as much as half an inch long. An evergreen Fern, requiring the warmth of the tropical Fernery to develop its beauties. Native of the West Indies.

C. sinuata.—An elegant and rare little Tree Fern, rising

upon a stem from one to three feet high, and in thickness about equal to a stout walking-cane, bearing upon its summit a crown of simple entire fronds, with undulated margins, from ten to fifteen inches long, and about one inch in breadth, tapering to a point; the colour is light shining green, and thin in texture, through which its beautiful venation is distinctly seen: it requires good fibry peat and sand to grow in. Native of Ceylon.

C. Smithii.—This is one of the handsomest of the whole genus; the stems are from ten to twenty feet high, with fronds ten or twelve feet long, bipinnate or tripinnate; the pinnæ being from ten to twenty inches long, and bright green in colour. The crown of the plant, and the base of the fronds, are densely clothed with long chestnut-coloured chaffy scales. It is a greenhouse species, but likes a little more warmth than the others from the same country, and also to be kept in a denser shade. The fronds are very graceful and feathery-looking, producing a fine effect. Native of New Zealand.

CYCLODIUM.

This is a small family—only one species is known to me, and that is very distinct in appearance, though it probably is nearly related to *Cyrtomium*; the rhizome is partially decumbent, and the fronds thick and leathery. It should be grown in peat and sand.

C. confertum.—A rare Fern in cultivation. The fronds are light shining green in colour, and from eighteen to thirty inches high, pinnate; the sterile pinnæ broad, and about six inches long; the fertile contracted and linear-lanceolate, with large sori covering the whole under side; indusium orbicular. An interesting and peculiar species,

requiring strong heat and an abundance of water to develope its beauties. Native of Guiana.

CYCLOPELTIS.

A genus which has, I believe, been made to receive this plant, and it seems sufficiently distinct under cultivation to merit it. The soil best adapted for it is good fibrous peat and sand, with the addition of a little loam.

C. semicordata.—This handsome and distinct Fern makes a beautiful object in a shady spot in a warm house. The fronds are pinnate, two feet long; the pinnae sessile, from three to five inches long, somewhat falcate and auriculate at the base, and bright dark green in colour. A desirable evergreen stove Fern. Native of the West Indies.

CYRTOMIUM.

A small genus, but the species comprising it are very distinct and handsome in appearance. One species is hardy, and by its use we are enabled to give additional beauty to our open air Ferneries. The other kinds may prove themselves to be equally hardy when properly tested; but, should they not succeed out-doors, they are very desirable plants for the cool Fernery. They should be potted in equal parts of loam, peat, and sand, and during the winter season should have water rather sparingly.

C. anomophyllum.—This is thoroughly distinct from the other species of *Cyrtomium*. The fronds are from one to two feet long, pinnate; the pinnae are numerous, about two inches long, falcate-lanceolate, and slightly auriculate, thin in texture, and dull dark green in colour. It has

been called *C. Fortunei*. An evergreen cool house species from Japan.

C. caryotideum.—A species of more recent introduction than the following, and very handsome. The fronds are pinnate, and about the same size as in *falcatum*, but the pinnæ are larger and auriculate at the base; it is more prostrate in habit also, and the substance of the frond is very different; in *falcatum* it is shining dark green and coriaceous, while in this species the pinnæ are thinner in texture, and light green in colour. A fine plant for the temperate house, and probably it may succeed in the open Fernery. Native of Nepal.

C. falcatum.—This fine Fern is perfectly hardy, but if used in the out-door Fernery it is deciduous, whilst in the temperate house it retains its beauty the whole year through. It produces a stout crown, densely scaly, and the fronds rise from this to the height of one or two feet; they are pinnate, the pinnæ elliptic-lanceolate in shape, about six inches long, of a very rich dark green colour; rachis and stipes densely covered with large light brown chaffy scales. Native of Japan and China.

CYSTOPTERIS.

Of this genus we have but few exotic kinds in cultivation, though the British species and varieties are numerous. The exotic kinds, like our native ones, are all deciduous. They are very beautiful and graceful plants, with the additional recommendation of being hardy, and consequently they form charming ornaments for the open air Fernery. They should be grown in rather stiff soil, and planted so that no water rests in their crowns during the season of rest.

C. bulbifera.—A handsome species, requiring little care

in its cultivation. It produces fronds from ten to eighteen inches long, bipinnate, having the segments deeply cut. The fronds bear a quantity of small bulbs on their under side, which drop about in various places, and quickly germinate. A deciduous hardy Fern, light green in colour. One of our oldest exotic species. Native of North America.

C. tenuis.—This is a most elegant Fern, closely related to *C. fragilis*, and forms a very pretty plant in a Wardian Case. The fronds are bipinnate, ovate-lanceolate, dark green in colour, and from six to ten inches high. This species is perfectly hardy, if the sunshine we sometimes get in winter does not excite it before the proper time. Native of North America.

DAVALLIA.

This is a well-known and deservedly popular family. Almost every one is acquainted with the Hare's-foot Fern, a name given in allusion to the brown scaly rhizomes, which bear a great resemblance, when destitute of fronds, to the foot of that animal. The majority of the species are from the East Indies and its Islands; some, however, are from Australia and New Zealand, one or two from Africa, and one—the well-known *canariense*—is from the South of Europe, Madeira, the Canaries, and adjacent islands; so that it will be seen they are widely distributed, and, consequently, many beautiful forms can be had for either the cool or the tropical house. Many of them are beautiful Basket plants, some succeed well in a Glass Case, and most of the species are very useful for cutting for bouquets, as well as for wreath-making for the decoration of ladies' hair. They should be a little elevated above the rim of the pot, so that a greater

surface may be given to the creeping rhizomes: one thing is necessary to observe in potting them, and that is, not to bury the rhizomes of any that are clothed with chaffy scales. I have seen this done; but death is sure to be the result. There are several other fine species besides those given here, but those whose collections are extensive, and who may wish for more information respecting them, are referred to the works of Hooker, Moore, Smith, &c.—men who have become famous for their intimate knowledge of Ferns in general.

D. aculeata.—A very pretty climbing species, the rachis bearing short thorns; length of fronds indefinite; the pinnae arc cuneate in shape, and bright green in colour. This makes a beautiful pot specimen, and also a fine object for climbing over rock-work or up a rustic pillar; it is always a pleasing object to the eye, and should be in every collection. Native of the West Indies.

D. bullata.—This very handsome small-growing kind is deciduous. The fronds are tripinnate, about ten inches in length, of a rich shining green colour, rising up from a creeping caudex, covered with bright reddish brown scales. A climbing species for Basket culture. Native of the East Indies.

D. canariensis.—This well-known species is a beautiful Fern for the greenhouse, either for a pot or basket, or for planting out. The fronds are bright green in colour, triangular in shape, and upwards of a foot in length. Native of South of Europe, Madeira, and Canary Islands.

D. dissecta.—This species is somewhat similar to *D. bullata*, but is larger, and may readily be distinguished by its stronger growth, its being evergreen, and by the scales upon the rhizome being much lighter in colour. This very handsome species produces fronds from one

to two feet in length, and six or eight in width; it is a splendid Fern for Baskets and bouquets. Native of Java.

D. divaricata.—This handsome species should be in every collection, and is a splendid one for planting in the Fernery. The fronds are four times divided, from two to five feet in length, the colour, when young, deep red, changing gradually to a deep shining green; the various hues, when seen together, have a beautiful appearance. It is more generally known as *D. polyantha*. Native of Java.

D. elegans.—Perhaps the most charming of all the *Davallias*. The tall shining fronds are produced from a stout creeping caudex, and are from eighteen to thirty inches in length, decompoundly divided, and rich dark green in colour. Native of the Malay Islands.

D. ornata.—A splendid strong-growing species. The fronds are produced from a stout woolly rhizome, and are from eighteen to thirty-six inches in length, smooth and tripinnate, with very large and broad pinnæ. An evergreen stove species from Singapore.

D. parvula.—This is the most exquisite species of the family in cultivation; it grows only a few inches high, with very finely cut dark green flabellate fronds, and has, at first sight, almost the appearance of a Filmy Fern; it is well adapted for a Wardian Case. An evergreen stove species from Borneo and Singapore. Very rare in cultivation.

D. pentaphylla.—A very distinct dwarf-growing kind, producing fronds from six to twelve inches long, pinnate; pinnæ three or four inches long, deep shining green in colour. An evergreen species of easy culture, worthy a place in every Fernery, and admirably adapted for Wardian Cases. Native of the Malay Islands.

D. solida. — A fine strong-growing plant, making a beautiful object when planted out in the warm Fernery. The fronds are produced from a creeping rhizome, which is covered with long brown scales; they are bi or tripinnate, and from twelve to twenty inches in length; pinnæ broad and stout, and deep green in colour. Native of the Malay Islands.

D. tenuifolia. — This extremely beautiful Fern is very widely distributed, and consequently presents many variations as to the length and breadth of its fronds, which are erect, usually ovate-lanceolate in shape, and bipinnatifid or tripinnatifid; pinnæ somewhat cuncate; frond from six to thirty inches in length, and of a lively green colour. An evergreen species which will succeed under a variety of temperatures: makes a splendid specimen for exhibition. Native of East Indies, China, Japan, the Pacific Islands, &c.

DENNSTÆDTIA.

This is a genus of beautiful Ferns, with creeping rhizomes, and of very handsome appearance, known to many by the name of *Sitobolium*. There are several very fine tropical and temperate kinds, and one hardy species. They are very desirable plants, especially for planting out in the Fernery, and several of them make elegant specimens under pot culture. Altogether they are fine additions to any collection, and are of very easy culture, thriving well planted in peat, loam, and a small quantity of sand, with good drainage.

D. adiantoides. — A free-growing and very handsome species, with bitripinnatifid fronds, from two to four feet high; pinnules obtuse, and bright light green in colour; sori large and prominent. A very ornamental Fern,

which will succeed well in either the cool house or stove. Native of tropical America.

D. anthriscifolia.—A very handsome strong-growing species: fronds two to four feet high, bright shining green in colour, bitripinnatifid; pinnæ upwards of a foot long, segments of pinnules broad and obtuse; sori prominent and bright reddish brown: an evergreen, distinct, and most desirable stove Fern, from tropical America.

D. cicutaria.—This is another large-growing, but handsome Fern: the fronds grow two to four feet high, tripinnate, and somewhat triangular in shape, of a bright light green in colour; the fertile fronds are a little contracted. When planted in a Fernery, several species of this genus propagate very readily, but none so freely as this. It is an evergreen stove plant from tropical America.

D. davallioides.—A beautiful species, very graceful in appearance, and producing fronds from one to three feet high, and about one in breadth, bitripinnatifid; pinnæ cut into small dentate segments, and slightly pubescent, colour rich dark green. This elegant plant should be in every Fernery: it is an evergreen temperate house species. Native of Australia.

D. moluccana.—This is one of the species not frequently met with in collections, and is very distinct. The fronds grow from one to three feet in height, tripinnate, and triangular in form, bright green in colour, and firm in texture; the rachis and stipes are slightly clothed with spines. A desirable temperate house Fern. Native of the Malay Archipelago.

D. Pavoni.—A very distinct and handsome Fern, well deserving a place in any Fernery: fronds from one to

three feet high, lanceolate and bipinnate; pinnae pinatifid, dark green in colour, and broad; the pinnules very obtuse. An evergreen stove Fern from Peru, &c.

D. punctilobula.—This is the only hardy species I am acquainted with belonging to the present genus: it is an interesting Fern, growing from ten to twenty inches high, lanceolate in form, and subtripinnate; pinnae very finely divided, light green in colour; rachis and stipes reddish brown. Native of North America.

DEPARIA.

A genus with only one species, but that is a very distinct and handsome one. It requires the heat of the stove and an abundant supply of water; it should be potted in loam, peat, and sand, and be well drained.

D. prolifera.—An exceedingly handsome and rare species. The fronds rise from a creeping rhizome, and are from one to three feet in length, somewhat triangular in shape, bipinnatifid, and light green in colour; the sori are marginal, being situated on the veins, which are exserted, so as to form pedicellate cysts; some of the fronds occasionally bear young plants upon the points. Native of the Sandwich Islands.

DICKSONIA.

This family of arborescent Ferns is invaluable for the decoration of the conservatory. In the group illustrated here, two belong to this genus, and the other is *Cyathea dealbata*. The most prominent figure represents a splendid specimen I imported with many others, and which was awarded the first prize for the finest and best Tree Fern at the Royal Horticultural Society's Exhibition at Kensington, in 1867. It stands about eighteen feet high.

and measures upwards of three feet in circumference at the base of the stem, having a splendid effect grouped with numerous ornamental foliage plants in the conservatory here. The figure on the right hand side is *D. squarrosa*, taken from a fine specimen growing in close proximity to the plant just alluded to; the stem of this is upwards of six feet in height, and the spread of its head of fronds between nine and ten feet. All the species of this genus in cultivation, excepting one, are natives of New Zealand, Tasmania, or Australia, where they are found inhabiting damp valleys and deep dark shaded ravines, attaining to enormous dimensions; they would, I have little doubt, thrive well and make highly ornamental objects out-doors in similar situations in the southern and western parts of England. *D. antarctica* grows in great abundance on Mount Wellington in Tasmania, and, as the Illustration shows, their fronds are often heavily laden with snow; so that, taking this fact, and the temperature of that country, into consideration, I think we have good reason to expect that they would stand uninjured in many parts of our own island. In Ireland, several *Cyatheas*, *Alsophilas*, and *Dicksonias*, natives of Australia and New Zealand, have been planted in sheltered spots in the open air, and are succeeding admirably; and I hope to see the same course adopted in England, wherever a favourable spot exists, for the Ferns would contrast finely when grouped with hardy exotic ornamental trees, and the whole would present a magnificent tropical and peculiarly beautiful appearance. Tree Fern stems have, within the last few years, been imported to this country in large quantities, and cost now very little money, so that any cultivators of Ferns having a spot they think suitable for the ex-

periment, can try it with but little outlay, and wherever it should be successful, I have no hesitation in saying they will render these places the most elegant of any in their whole establishments. The ground should be prepared well for these plants by removing the natural soil from a space about six feet square and some three or four feet deep, the bottom to be well drained, so that the roots may not be rotted and the soil soured by stagnant moisture, and then filled up to the proper level again with a mixture of light fibrous loam and good peat, in about equal parts, with the addition of nearly one third clean river sand, which must be made firm and hard round the Fern when planted. The treatment for *Dicksonias* under pot culture will be found in the chapter devoted to Tree Ferns at page 13, where I think all that is necessary for the successful management of these plants, both temperate and tropical, has been explained.

D. antarctica.—A truly noble Fern. The trunk varies considerably in thickness, and attains the height of thirty feet or more, and the spread of its magnificent crown of fronds is some twenty or thirty feet. The fronds rising from the hairy crown are lanceolate in shape, tripinnate, rigid, and rich shining dark green in colour on the upper, but lighter on the under surface, beautifully arched, becoming pendulous with age, and from six to twenty feet long, though, up to the present time, I am not aware it has grown so large in this country. This species—though now the most common of the arborescent kinds in cultivation—is universally admired; the hardiness of its constitution, and the beautiful symmetry of its stem and crown of fronds, admirably adapt it for all purposes of decoration. An evergreen temperate species, which,

from the demand there is for it, will soon become everybody's Fern. Native of Australia.

D. arborescens.—This fine plant is apparently difficult to establish when imported of large size from its native country. The stem grows from eight to twelve feet or more in height, often with several branches, and the crown is densely clothed with amber coloured silky hairs. The fronds are five or six feet long, bipinnate; the pinnules are very obtuse, and light green in colour; the stipes and rachis very tomentose. A beautiful stove Fern, at present very rare in cultivation, and singular in being only found in the island of St. Helena.

D. fibrosa.—A very fine species, which produces stems some twenty feet or more in height. It resembles *D. antarctica* somewhat, but can be readily distinguished by the stem being much thicker in proportion to its height, and by its shorter and broader fronds, the pinnules of which turn upwards at the ends, and give the whole surface a bristly rigid appearance. This noble plant is seldom to be met with at present in cultivation, but I hope to introduce it into many other collections shortly. Native of New Zealand.

D. lanata.—This fine Fern is very rarely met with in cultivation. The fronds are bipinnate; the pinnules pinnatifid, broad, and dark green in colour; stipes muricate throughout their entire length, and densely clothed at the base with large white chaffy scales. Native of New Zealand.

D. squarrosa.—This is a very handsome species. The stems are slender and black, often branched by its forming young plants at intervals up its trunk. The fronds are rigid, dark green on the upper side, paler

beneath, from three to six or more feet long, and tri-pinnate; stipes black, muricate, and hirsute. The habit of its head is very singular and beautiful, being flat, and presenting the appearance of a table top, some idea of which can be obtained from the Illustration. It is a very elegant and choice Fern, which well deserves to be generally cultivated. A cool house species from New Zealand.

D. Youngiae.—A recent addition to this genus, and I have only seen it in the shape of young plants at present. It resembles the preceding somewhat in general appearance, but is said to be a very elegant and distinct slender-stemmed species of a different texture. Native of New South Wales.

DICTYOGRAMMA.

This is a very interesting plant, only one species, that I am aware of, being in cultivation. It may probably prove itself a hardy species; but I cannot say anything respecting that, as I am not aware of its having been tried by any one. The plant resembles *Gymnogramma javanica* in general appearance, but differs from that in having reticulated veins, which are beautifully shown when the fronds are fertile. The plant is of recent introduction, before which, though it was known to exist, specimens of it even were very rare. It should be grown in loam, peat, and sand, and supplied with a moderate amount of water.

D. japonica.—A distinct and rare Fern, which grows from one to two or more feet high; fronds pinnate, or bipinnate, and smooth; pinnae somewhat lanceolate in shape, from six to ten inches long, and dark green in colour. A very desirable evergreen Fern, which may prove hardy. Native of Japan.

DICTYOPTERIS.

The plants comprised in the present genus have been separated from *Polypodium*, I think very justly. They are of easy culture, the species named below making a compact mass if planted on some rocky ledge in the cool Fernery, or it makes a very pretty plant grown in a Wardian Case, contrasting well with some of the finely divided fronds of other kinds. If grown in pots, the soil should be peat and sand, a little elevated above the pot, as the plant has a creeping rhizome.

D. attenuata.—A very neat and interesting plant. The fronds are from nine to twelve inches long, simple, linear, coriaceous, glabrous, and deep green in colour; sori large, and reddish brown, contrasting well with the rich dark green of the fronds. An evergreen greenhouse Fern, well deserving a place in every Fernery. Native of New South Wales and Victoria.

DICTYOXIPHIMUM.

This genus, which I believe consists of but one or two species, is nearly allied to *Lindsaea*, from which it differs but slightly. Only one species is known in cultivation, and this should be grown in peat and sand, with good drainage, and it enjoys an abundance of heat and moisture.

D. panamense.—A handsome and distinct Fern, with an erect caudex, simple, entire, linear-lanceolate fronds, the barren ones somewhat broader than the fertile, from twelve to twenty-four inches long, and shining dark green in colour; stipes scaly; sori situated in the margin. A very desirable evergreen stove plant. Native of Panama.

DIDYMOCHLÆNA.

The only species that I am acquainted with : requires stove temperature, and an abundant supply of water, for if once allowed to get dry at the roots, the pinnae fall off, leaving the rachis and stipes naked. This plant should be potted in good fibrous peat and silver sand, and kept well shaded.

D. lunulata.—A very distinct and handsome Fern, which I have never seen furnished with much stem. The fronds are broadly lanceolate in shape ; the pinnules oblong elliptical, with a truncate base, overlapping each other, and of a vivid dark green colour ; and the rachis and stipes are densely covered with long brown chaffy scales. A very handsome plant. Native of the Malay Islands and tropical America.

DIPLAZIUM.

A very handsome family of Ferns, with but little to distinguish them from *Asplenium*, except the double sori. They are of easy culture, and very ornamental ; many are fine plants for a Fern Case, some of them presenting thoroughly distinct forms, and others are very interesting to the pteridologist. The soil they thrive best in is a mixture of peat, sand, and loam, and all like an abundant supply of water, if the drainage is good, and none of it remains stagnant about their roots. They also make good kinds to plant out on rock-work, and when grown in pots they make fine ornamental and effective plants.

D. alternifolium.—A fine distinct species, growing about eighteen or twenty inches in height ; fronds pinnate ; pinnae ovate, five inches long and two in breadth

at the widest part, dark heavy green on the upper side, the veins on the under surface being thickly covered with dark brown sori. An evergreen stove Fern, requiring strong heat to grow it to perfection. Native of Java.

D. arborescens.—This is a noble-growing cool house Fern, developing a short stem with age. The fronds are two to four feet long, bipinnatifid; the pinnae twenty inches long, and fine dark green in colour; and the crown of the plant and base of the fronds are clothed with black chaffy scales. Native of St. Helena.

D. coarctatum.—A handsome Fern, well worth cultivation, and one that will succeed in either Fernery. Fronds bipinnatifid, from one to two feet high; pinnae broad, and dark green; the sori very bold. Native of Brazil.

D. Franconis.—This is a very elegant Fern. The fronds are deltoid, decompound, from one to three feet high, and one to two in breadth, finely divided, and dark shining green in colour; sori very conspicuous. A most beautiful evergreen species, and one that makes a fine object in a Fern Case of good size. Native of Mexico, Jamaica, &c.

D. grandifolium.—A distinct and charming Fern for the house or Wardian Case. The fronds are from twelve to thirty inches long, pinnate; pinnae alternate, four inches long, and about one and a half broad, pinnatifid at the apex, and bright shining green in colour; sori broad and very conspicuous. An evergreen species, from tropical America.

D. juglandifolium.—This grand species grows from one to four feet high: fronds pinnate; pinnae acuminate, eight inches in length, and two and a half in breadth, dark

green in colour, the sori giving the under side a beautiful appearance. A very desirable and somewhat rare Fern, from Jamaica, &c.

D. lanceum.—A very distinct and rare Fern, and one that may prove hardy. It makes a handsome plant in the temperate house. The fronds are simple, bright green in colour, linear-lanceolate, and entire, from six to fifteen inches long; stipes scaly at the base; sori in conspicuous lines on the under side. It makes a very nice contrast in a Fern Case. Native of China and Japan.

D. plantagineum.—A handsome species, well deserving a place in every collection. Fronds from six to twelve inches long; about two in breadth, simple, entire, and shining dark green in colour on the upper side, beautifully marked with the sori on the under surface. An erect and compact Fern, admirably adapted for a Wardian Case. Native of tropical America.

D. Shepherdii.—This is a handsome and well-known Fern, though it has many synonyms. The fronds are from one to two or more feet high, broad and bright green in colour. It will succeed well in the cool house. Native of the West Indies.

D. thelypteroides.—A handsome hardy species, growing from twelve to eighteen inches high. Fronds bipinnatifid, and light green in colour. A fine hardy Fern, from North America.

D. Thwaitesii.—This is a pretty and distinct species, making fronds from ten to fifteen inches high, bipinnatifid, light green in colour; stipes hirsute. An evergreen species, suitable for the Fern house or a Wardian Case. Native of Ceylon.

D. zeylanicum.—A distinct and handsome Fern, admir-

ably adapted for a Wardian Case. The fronds are from six to twelve inches long, erect, the lower part of the frond pinnate, the upper pinnatifid, bright green in colour; stipes densely scaly. An evergreen stove Fern, from Ceylon.

DOODIA.

A small but very pretty genus, nearly allied to *Woodwardia*. The species are very accommodating in habit, thriving either in the tropical or temperate house. As plants for Wardian Cases they are unrivalled, and for mixing with cut flowers to decorate the dwelling-house they are equally valuable, as the texture of the fronds keeps them fresh for a considerable time. Potted in peat and sand, the pots being well drained, they will form very pleasing specimens for almost any purpose, and make nice objects for the crevices of rocks, where there is sufficient soil to plant them in.

D. aspera.—An erect bold-growing species. Fronds lanceolate and pinnatifid, broadest in the centre, about eight or ten inches in length, and very dark green in colour. A rigid evergreen species, thrives well in the cool house. Native of Australia.

D. aspera var. *corymbifera*.—A very pretty variety of the former, dwarf and erect in habit, the apex of the fronds densely crested. A very singular, distinct, and handsome form, very suitable for growing in the Wardian Case.

D. blechnoides.—The largest species of this family with which I am acquainted, the fronds often reaching from ten to eighteen inches in length; they are produced from an erect caudex, and are broadly lanceolate, pinnatifid, and rigid. An evergreen cool house plant. Native of Australia.

D. caudata.—This is a very common kind, but one of the best for Glass Cases, and is also very useful for bouquets; it may be grown on the wall, or in any crevice in the Fernery. The fronds are from six to eight inches in length; the fertile and sterile ones distinct—the sterile fronds pinnate, with oblong pinnæ, the fertile ones pinnate, with contracted pinnæ, the pinnæ cordate at the base in both, and the frond caudate at the apex. Native of Australia.

D. caudata confluens.—This very pretty variety closely resembles *D. caudata* in the sterile fronds, but the fertile fronds are less divided. It has also been called *D. linearis*, and is a charming plant for the Glass Case. The fronds rise from an erect caudex, are about eight or nine inches long, the barren pinnatifid below, the fertile confluent, so as to become linear, and much contracted. Native of New Caledonia.

D. dives.—This is one of the finest and most distinct of the genus. The fronds are from twelve to eighteen inches high, dark green in colour, pinnate; the lower pinnæ stipitate, and auriculate on both margins, and about two inches long; the upper ones shorter and sessile; stipes black and slightly scaly; sori large and prominent. A very handsome evergreen tropical species. Native of Java.

D. media.—An evergreen cool house plant, and perhaps the prettiest in the genus. The fronds are from ten to twenty inches long; when young light red or pink, changing to a dark green with age; slender and pendulous in habit, lanceolate in form, pinnate, and spiny-toothed at the margins of the obtuse pinnæ. It is also known as *D. lunulata*. Native of New Zealand.

DORYOPTERIS.

All the species belonging to this genus are well deserving cultivation, being dwarf and compact in habit, and very distinct and handsome in appearance. They are nearly related to *Pteris*, and have the sori marginal as in that genus, but the veins are beautifully netted instead of free. Potted in peat, sand, and a little chopped sphagnum moss, they will be found easy to grow to good plants; and though usually called stove evergreens, they will stand in a cooler temperature without injury; the smaller species are well adapted for Wardian Cases, and all will succeed well in the Fernery if suitable places are chosen for them.

D. collina.—A beautiful evergreen stove species, with fronds of a lively dark green colour, eight or ten inches high, and about four inches wide, palmate in form, shining, and of good substance; the sori are marginal, as in *Pteris*. Native of tropical America.

D. nobilis.—This is, indeed, a noble species. The fronds are, in a young state, simple and sagittate, but as the plant gains age and acquires strength, they become palmate in form, about twelve or eighteen inches in height, excluding the stipes, and nearly as much in width; the colour is a bright green, the centre of the fronds or of the segments having a broad band of white in the younger stages. A most desirable plant. Native of Brazil.

D. palmata.—This handsome plant resembles *collina*, but is much larger in all its parts, and prolific at the top of the stipes. It is an evergreen stove species, producing fronds about a foot high, and four inches in

width, deeply palmate, of a bright green colour. Native of tropical America.

D. sagittæfolia.—A charming and very distinct compact-growing species. The fronds are simple, sagittate, erect, and coriaceous, attaining to a foot in height, bright green in colour, and with a black stem. A stove evergreen plant. Native of Brazil.

DRYMOGLOSSUM.

† A genus consisting of but few species. The fronds are produced from a creeping rhizome, and are either contracted and fertile in the upper part, or the fertile ones are distinct and contracted. It should be potted in a mixture of peat and sand, with a little loam, and grown in the tropical house.

D. lanceolatum.—This plant is rare in cultivation. When grown freely it makes a handsome mass, the simple lanceolate fronds being from ten to twenty inches long, coriaceous, and shining light green in colour, contracted towards the apex where fertile; the sori are marginal, without an indusium. Native of Jamaica, &c.

DRYNARIA.

A noble family of Ferns, forming splendid objects in the tropical Fern house. Some species produce fine broad fronds, several feet in height, and consequently show to much advantage. They make large fleshy rhizomes, and should be slightly elevated above the rim of the pot, upon pyramids of fibrous peat, the rhizome being pegged down to keep it firm until root action commences, when no further fastening will be necessary. Either *D. coronans*, or *D. morbillosa*, would make a splendid object if such a spot as the summit of a projecting rock could be got for

them, and as their rhizomes have a tendency to grow in circles, they would throw up fronds all round, and sit upon it like a massive crown. All the species that I am acquainted with are from hot countries, and require stove heat. Some of those having two distinct kinds of fronds, which is distinctive of the true species, are partially deciduous, the barren shield-like fronds dying in winter, and turning brown, but not falling off the plant.

D. coronans.—A very fine and noble-growing plant. The fronds are pinnatifid, rigid, proceeding from a short, thick, and fleshy rhizome; in large specimens the fronds attain the height of three and four feet, and nearly two feet in breadth. It makes a grand ornament to a Fernery, and is also a good exhibition plant. Native of Malacca.

D. diversifolia.—This handsome species is, from its pendulous habit, admirably adapted for suspending in baskets. The fronds are from two to upwards of four feet long, pinnate, light green in colour; the barren fronds are about three inches or more high, cordate at the base, and lobed on the upper edge; the sori are round, and immersed in the fronds, forming elevations on the upper surface like buttons; it should be in every collection. Native of the East Indies and Australia.

D. morbillosa.—A fine large-growing Fern from the Malay Islands. The fronds are stiff, light green in colour, pinnatifid, and from three to five feet in height, by two in breadth; an evergreen stove species, and a beautiful object to plant on rock-work.

D. musæfolia.—This, though a species with simple fronds, is an exceedingly beautiful plant, rendered so by its reticulated venation being so distinctly seen; suspended in a Basket where the light shines upon it, it presents a lovely object, and one the eye never tires of looking

upon. The fronds are pale green in colour, with dark green veins, about eighteen inches in length, and from two to three in breadth. An evergreen stove Fern, from the Malay Islands.

D. quercifolia.—A distinct and rare species. The sterile and fertile fronds are very dissimilar; the former being oblong-ovate in form, cordate at the base, sessile, and about six or seven inches long; and the latter, from one to two feet in length, pinnatifid, and dark green in colour. Native of the East Indies, Mauritius, and Australia.

ELAPHOGLOSSUM.

Of this genus I have selected the best with which I am acquainted, though many beautiful species have not yet been introduced to this country. All have simple fronds, and are of easy culture: but those that are covered with chaffy scales should not be syringed. These plants have been very properly separated from *Acrostichum*, to which they bear no affinity. The kinds with long fronds will make fine specimens suspended in Baskets, and some of the erect-growing ones will succeed well in the Wardian Case: they should be potted in peat, chopped sphagnum moss, and sand, and as they like an abundant supply of water at the roots, care must be taken that the drainage is good.

E. cuspidatum.—This is a dwarf and handsome evergreen stove species. The sterile fronds are from four to seven inches in length, simple, entire, and linear-oblong in shape, densely squamiferous on both sides, more particularly on the under; stipes also thickly coated with red scales; fertile fronds smaller, the sori covering the entire under side. Native of the West Indies.

E. Herminieri.—A beautiful species, very rare in cultivation. The fronds are from one to three feet long, and from two to three inches broad, thick and leathery; on the upper side the colour is a bright lustrous blue: its pendulous habit would make it a fine plant for suspending in a Basket. Native of Trinidad.

E. piloselloides.—This very elegant little Fern is rarely to be met with; the fronds are about three inches high, simple, entire, and spatulate in shape, densely covered with long hairs. It is an evergreen stove species, from tropical America.

E. scolopendrifolium.—A very distinct and handsome Fern, producing fronds densely covered on the margin and stipes with brown chaffy scales, and about twelve inches long, oblong-lanceolate in shape, and simple; the fertile fronds only differ in their smaller size. Native of Brazil.

E. squamosum.—A most interesting and remarkable plant. The sterile fronds are narrow, about an inch in width, elliptical, and from four to eight inches in length, densely covered on both sides with large brownish red scales when fully mature, but nearly white when young; fertile fronds narrower and shorter. A very rare plant in cultivation. Native of the West Indies and tropical America.

E. viscosum.—Another species of this genus which well deserves general cultivation. The fronds are from one to two feet long, and an inch in breadth, pendulous, scaly, and greyish green in colour, forming a beautiful vase-like plant; it is also admirably adapted for suspending in Baskets, and is sufficiently hardy to stand well in the cool house nearly all the year round. Native of the Philippine Islands.

FADYENIA.

This is a peculiar little Fern, and one admirably adapted for a Wardian Case. It should be grown in peat, with a little loam and sand. I have only seen one species in cultivation, and it is totally different from any other Fern with which I am acquainted.

F. prolifera.—This curious plant grows much finer under a bell-glass than in the open Fernery, and consequently is well suited for a Fern Case. The fronds are of two kinds. The sterile ones are prostrate and lanceolate, producing young plants at the apex, which root and make fertile plants without becoming disconnected from the parent; the fertile fronds are from five to six inches long, linear, ligulate, obtuse, and erect, with large reniform sori on the under side; colour dark green. Native of Jamaica.

FEEA.

This genus is distinguished from *Trichomanes* by its contracted rachiform fertile fronds, which are quite unlike the sterile. It is a beautiful free-growing plant, and well deserving of general cultivation. The treatment recommended for *Trichomanes* and *Hymenophyllum*, in the chapter headed Filmy Ferns, will suit this in every respect.

F. spicata.—A handsome dwarf plant, producing very dark green pinnatifid sterile fronds, from two to six inches in length, and prostrate; fertile erect, about six inches high, presenting the appearance of spikes of little bells. It is a distinct and beautiful species, requiring an abundance of water. Native of the West Indies.

GLEICHENIA.

This is a most singular family of Ferns, and, at the same time, one of the handsomest of the whole tribe. They have been divided into two sections by some authors, but, for convenience sake, I shall not divide them in this book. The distinguishing characters, in the first section, or the true *Gleichenias*, are these:—the pinnules or segments are orbicular, and resemble quantities of beads strung upon threads, of which *G. dicarpa* and *microphylla* may be given as examples; the length of the fronds is indefinite, and, in their wild state, they assume the character of climbers. I believe this section is entirely confined to Australia, Tasmania, New Zealand, and New Caledonia. The second division, or *Mertensia* group, as it is frequently called, is distinguished by a more erect growth and by the broader fronds, with larger linear pinnæ. *G. flabellata*, *dichotoma*, and *furcata* illustrate this section well; and all of them, I think I may safely say, save one or two, luxuriate in tropical countries. *G. dichotoma* seems to be of a very accommodating constitution, and has distributed itself very widely; I have myself received it from Ceylon, Malacca, Penang, Assam, Hong Kong, Japan, Jamaica, and Trinidad—of course, having a somewhat different appearance from some of these localities, but the variations are very slight. These Ferns make splendid specimens. Of *G. flabellata*, I have seen plants fully thirteen feet in circumference, and nearly five feet in height, forming quite a miniature forest of fan-like fronds. The finest of the first section I ever saw was under the management of Mr. Peteh, in the collection of S. Mendell, Esq., Manchester, where a house is devoted to the culture of these aristocratic-

looking Ferns; several that I saw there measured upwards of five feet in diameter, and three or more in height. The charming effect and beauty of such magnificent specimens as these must be seen to be fully realised, from the fact of their being so totally different in appearance to any other of their tribe. They are the finest Ferns we have for exhibition purposes, being good travellers; but they require strict attention to cultivate them successfully, careful watch being kept over them, as they are very liable to attacks of the scale, which soon destroys their beauty, particularly if they are grown in a warm house. The soil should be good fibrous peat, broken up roughly, with a mixture of silver sand. An abundance of pot room is necessary, to allow the wiry creeping rhizomes to spread, but it must be borne in mind never to give them deep pots, as they do not root deeply into the soil, but like to keep near the surface, and the pots must also be thoroughly drained; when growing, a liberal supply of water should be given, and the plants themselves, in addition to everything about them, should be in a state of perfect cleanliness, or success should not be looked for.

G. alpina.—This is the dwarfest form of the whole genus. The fronds are from three to twelve inches high; the pinnæ are about an inch long; the segments are small, and resemble beads upon a thread, bright green in colour on the upper side. If not quite hardy, it is a beautiful species for the cool Fernery. An evergreen greenhouse Fern which should be in every collection. Native of Tasmania.

G. circinata.—The scandent species, of which this plant, commonly known under the name of *G. microphylla*, is another example, resemble each other very

much in general outline. The stems and branches of this species are covered with chaffy reddish brown hairs; the segments are subrotund, and not pouched below, and it is larger in all its parts than the former. An evergreen species, from New South Wales and Tasmania.

G. circinata glauca.—A very fine variety of the preceding, differing in being more robust in growth, and thicker in texture; the young growths, and the under side of the fronds, are beautifully glaucous. Native of New Zealand, &c.

G. Cunninghami.—This fine species of the *Mertensia* group is very rare in cultivation at present; it is erect in habit, producing large fan-shaped fronds, from one to four feet high, which are bright green above and glaucous beneath; they are several times dichotomously branched, the segments being from six to eight inches long. The young growths are covered with large brown chaffy scales. Native of New Zealand.

G. dicarpa.—A very elegant and interesting species: a greenhouse evergreen Fern. The fronds are scandent, dichotomously divided, the branches pinnate, the pinnae pinnatifid, and the segments small and orbicular, with the margins recurved; the stems are hairy, the length of the fronds being indefinite, but the branches are smooth. The largest specimen I have seen measured some three feet high, by two and a half in diameter. Native of Tasmania.

G. dichotoma.—This fine species of the *Mertensia* group is general throughout the tropical and sub-tropical regions of the southern half of the globe, and consequently varies considerably. It is an erect evergreen stove Fern, producing its fronds, which are from three to five feet high, from a wiry creeping rhizome; they



GLEICHENIA CIRCINATA, var. GLAUCA. *Moore.*

New Zealand.

are dichotomously divided, the pinnæ being some eight inches long and two wide, bright green above, glaucous beneath. It makes a handsome specimen.

G. flabellata.—This very beautiful species is of tolerably easy culture. It is an erect-growing kind of the *Mertensia* group, and makes a fine exhibition plant. I have seen this species in a square tub, the fan-like fronds measuring nearly five feet in height, and about twelve feet in circumference, presenting a charming effect amongst the plants by which it was surrounded: an evergreen cool house Fern, which should be universally cultivated. Native of Australia and Tasmania.

G. furcata.—Another very fine species, but at present rare in cultivation. It belongs to the *Mertensia* group. Fronds several times dichotomously branched; pinnæ linear and pinnatifid, dull green in colour, and slightly pubescent. A handsome warm house species, from the West Indies.

G. hecistophylla.—A very handsome slender-growing species. The fronds are dichotomously branched, and resemble those of *dicarpa*, but are larger in all their parts. It has the stems and branches densely covered with short reddish brown hairs; the segments are small and saccate; and the length of frond indefinite, bright dark green in colour and smooth. Native of New Zealand.

G. pectinata.—A very beautiful kind of the *Mertensia* group, resembling *G. dichotoma* in appearance. It is not, however, so strong a grower, neither are the fronds so many times divided, but it is much more glaucous beneath. An evergreen stove species. Native of the West Indies.

G. pubescens.—A very handsome species, from the warm parts of Brazil. Fronds several times dichoto-

mously forked ; length of fronds indefinite, their colour dark green above, covered on the under surface with a light brown pubescence. It is the *Mertensia pubescens* of some authors. This fine plant should be cultivated in every tropical Fernery, where it grows rapidly, and forms a specimen of great beauty. Very rare in cultivation.

G. rupestris.—This species has a dense and symmetrical habit, and is very rare in cultivation. The fronds are from two to six feet in height, dichotomously branched ; the branches pinnate ; the pinnæ broad and pinnatifid, not pouched, rich deep green in colour above, very glaucous beneath ; the stems of a reddish purple. An evergreen species, and very handsome. Native of New South Wales.

G. semivestita.—A very beautiful evergreen kind, from New Caledonia, and will consequently want a warmer corner than the Australian species. It is very similar to and perhaps merely a form of *G. circinata*. The fronds are forked, the branches being pectinate ; pinnæ pinnatifid, and not pouched ; stems slightly hairy ; branches thickly covered with reddish hairs ; length of fronds indefinite, their colour a rich dark green.

G. Speluncea.—This is a handsome, large-growing, and very distinct greenhouse evergreen species. Fronds forked, pinnate ; pinnæ pinnatifid, not pouched, of a light green colour on the upper surface, and glaucous below ; length of frond indefinite. A very desirable species, which makes a splendid specimen for exhibition. Native of New South Wales and Tasmania.

GONIOPHLEBIUM.

A genus of handsome Ferns, and one that contains some species well adapted for a Wardian Case, while

others extend their fine pinnato pendulous fronds downwards for ten and twelve feet, the pinnæ being beautifully ornamented on the upper side with protuberances, which look like rows of buttons—this being caused by the sori being immersed. The pendulous kinds make magnificent Basket Ferns, if planted in a mixture of sphagnum moss and peat; a layer of sphagnum should be first placed in the Basket to prevent the finer soil being washed away. When grown in Baskets they require moisture more frequently applied to the roots; this is best done by taking the Baskets down and giving the material a good soaking.

The small group named *Lepicystis* consists of handsome dwarf-growing plants, well suited for a Wardian Case or the cool Fernery, where they make handsome and highly interesting objects. They are represented by *G. incana* and *G. Lepidopteris*, and are remarkable for having the entire under surface of the fronds covered with very large brown or white ciliated scales. Though these species are from tropical America, they succeed best in the cool house. Fibrous peat and sand is the best mixture for them, with a liberal supply of water at their roots, but they should not be watered over head.

The species referred to *Lopholepis* are dwarf-growing but very interesting Ferns, which succeed well in a Wardian Case, and their neat habit renders them peculiarly adapted for such situations; if planted in the soil at the base of a Tree Fern, they will soon climb up the stem. A very pretty object may also soon be made if a dead trunk of a Tree Fern is covered with one or several of this dwarf trailing species. If grown in pots, they should be potted as recommended for pyramids at page 13, but as Basket plants or climbers, they

are seen to more advantage, and display their natural habit.

G. appendiculatum.—A very beautiful species, which will succeed well either in a cool or warm Fernery. The fronds are oblong, deeply pinnatifid, about a foot or more long, of a pale green, except the rachis and veins, which are a deep crimson, giving the whole plant a very handsome and striking appearance. It thrives well in a Glass Case. Native of Venezuela and Mexico.

G. colpodes.—This is a handsome and distinct stove Fern. The fronds are dark green in colour, about two feet long, somewhat lanceolate in shape, and pinnate, becoming pinnatifid towards the top. An evergreen species, from Venezuela.

G. glaucum.—A beautiful dwarf-growing kind, making a fine object in the Wardian Case. The fronds are ovate-lanceolate in shape, and very symmetrical in outline, pinnatifid, ten to fifteen inches long; pinnules obtuse at the points, glabrous, and grey or bluish green in colour. An evergreen stove species, from Brazil.

G. incana.—A very interesting and singular species. The fronds are from three to six inches long, deeply pinnatifid and leathery, in colour dark green, the whole of the under side clothed with a dense covering of round ciliated scales, of a dull brown colour. A cool house species, from tropical America and Southern United States.

G. Lepidopteris.—A very handsome Fern, deserving to be more generally cultivated: it produces lanceolate pinnate fronds, with oblong and obtuse sessile pinnae, from ten to twenty inches long, dark green in colour, with a covering of whitish ciliated scales; sori confluent, and deep red in colour, giving it a beautiful ap-

pearance. A stove species from tropical America. Also known as *G. sepulta*.

G. piloselloides.—This pretty little Fern is seen to great advantage when grown in a small Basket, and suspended from the roof of a large Wardian Case. The fronds are produced from a long wiry creeping rhizome, and are dissimilar; the sterile ones simple, entire, and ovate, about two inches in length; the fertile ones also entire, contracted, linear, and obtuse at the apex, from two to three inches in length; sori reddish brown, large and conspicuous; colour of fronds light green, squamose on both sides. An easily grown evergreen stove species. Native of the West Indies, &c.

G. squamata.—This is a magnificent and singular Fern. growing from twelve to thirty inches in height, and five to seven in breadth; fronds pinnate, and lanecolate in form; pinnæ about three or four inches long, densely covered, as well as the stipes, with large brown ciliated scales. A most desirable and highly ornamental species, from the West Indies.

G. subauriculatum.—This Fern should be grown in every Fernery where a Basket is suspended, as it is one of the very best for this purpose in cultivation, the graceful lively green pinnate fronds attaining the length of six to ten feet, hanging down, so as to form a perfect bower; the sori are sunk in the frond, and form little wart-like protuberances in rows upon the upper surface. An evergreen stove species. Native of the Malay Islands.

G. vacciniifolium.—A pretty dwarf-growing stove Fern. The rhizome of this species is much stouter than in *G. piloselloides*, which it resembles in habit, and is thickly covered with scales; the fertile fronds are about two inches long, simple, linear, and smooth; the barren

are nearly round, and from half an inch to one inch long, smooth, and dark green in colour. An evergreen stove species, from Brazil.

G. vacciniifolium albidum.—This plant resembles the preceding in everything except colour, but that is a metallic white, and remains so through all stages of its growth, making a striking contrast with the dark green of the other. A very nice little Fern for a Wardian Case, or for growing upon the trunk of a Tree Fern. Native of Brazil.

G. verrucosum.—A fine companion plant for *G. subauriculatum*, though much broader and longer in the pinnæ. The fronds are pendulous, from four to six feet long, pinnate; pinnæ six to eight inches long, vivid green in colour. Native of Malacca.

GONIOPTERIS.

A handsome genus of Ferns. Some are small growers, and well suited for Wardian Cases, while others make beautiful ornamental specimens in the Fernery, and some again are well adapted for suspending in small Baskets. The stronger-growing kinds should be potted in a mixture of peat, loam, and sand; the less robust will succeed best without the loam, requiring a good supply of water at the roots when they are in vigorous growth.

G. asplenoides.—Fronds ten to fifteen inches long, pinnate; pinnæ alternate, from one to two inches long, bright green in colour. A handsome Fern, well adapted for a Wardian Case, and the fronds last a considerable time when cut and put in water. Native of Jamaica.

G. crenata.—This is a very handsome Fern, well adapted for the Fern house or Wardian Case, making a beautiful specimen in either. It grows from ten to fifteen or more inches high; the fronds are pinnate;

the pinnæ six inches long, and nearly two in breadth, crenulate on the margins, and a rich dark green in colour. Native of the West Indies.

G. diversifolia.—A strong-growing evergreen plant. The fronds are about four feet high, and proliferous at the apex—indeed, I have frequently seen a large specimen of this Fern with quite a number of young plants still upon it, having fronds two feet long. It is a pinnate species, with the pinnæ from three to six inches long, and of a light green colour. This plant is known by the names of *Goniopteris fraxinifolia*, *G. viviparia*, and *Polypodium proliferum*. A stove Fern, from Brazil.

G. Fosteri.—A fine distinct Fern, and a very ornamental species for the cool house. It grows from twelve to thirty inches high. The fronds are pinnate, with the pinnæ opposite, from two to three inches long, pinnatifid, and bright green in colour. An evergreen Fern, sometimes called *G. pennigera*. Native of New Zealand.

G. Ghiesbreghtii.—This is a very handsome plant. It makes fronds some thirty inches high, pinnate; the pinnæ opposite, seven inches in length, and one and a half in breadth, deeply toothed on the margins, and pale green in colour; the whole plant densely covered with short white hairs. An evergreen stove Fern, from tropical America.

G. gracilis.—A handsome slender-growing species. The fronds are dark green in colour, about eighteen inches long, pinnate about half way up, and then pinnatifid; the pinnæ in some fronds are auriculate. A very nice plant for suspending in small Baskets. It is probably a more developed form of *G. reptans*. Native of Jamaica.

G. refracta.—A distinct and handsome species. The fronds vary from one to two feet in height, seven inches

in breadth, intense green in colour, and pinnate; the lower pair of pinnae turned back the reverse way, as if broken. A very desirable plant, which will thrive well in a Fern Case. Native of Brazil.

G. reptans.—This elegant little plant somewhat resembles *G. gracilis*. I have seen it producing a beautiful effect in a Wardian Case when suspended in a small basket from the roof. The fronds are about twelve inches long, proliferous at the apex, and pinnate; pinnae usually small, but sometimes broad and obtuse; colour light green. Native of Jamaica.

G. scolopendrioides.—This is a beautiful species, succeeding well in a Wardian Case. The fronds are from six to twelve inches long, pinnatifid, and lanceolate in shape, erect and dark green in colour. Native of Jamaica.

G. serrulata.—Fronds thirty inches high, pinnate; pinnae eight inches long, and one and a half broad, toothed at the margins, and dark green in colour; sori reddish brown, large and prominent. A very desirable plant, as it makes a beautiful and distinct specimen. Native of Jamaica.

G. tetragona.—This highly ornamental species sometimes attains the height of four feet, but is more frequently seen much less. The fronds are pinnate, the pinnae being deeply and regularly lobed, about six inches long, and half an inch in breadth. A Fern well worthy general cultivation. Native of the West Indies.

Gymnogramma.

To an amateur Fern grower this genus includes some of the most attractive and beautiful species in cultivation, which are well known by the name of Gold and Silver Ferns. These names seem to have been specially applied

to species of this family, from their having been the first which were familiarly known to have the fronds covered with the brilliant farinose powder from which the principal part of their beauty is derived, though now we have in our gardens other Ferns, belonging to various genera, which are adorned in the same way. With the present genus, however, this farinose powder does not seem to be constant, for I have seen a plant of *G. chrysophylla* in which half the fronds were clothed in the usual way, while the others were quite destitute of the peculiar covering. Such an example is, I believe, of rare occurrence, and valuable only as a curiosity. The whole of the species, however, are not decorated in this way, some of them, such as *rufa*, *tomentosa*, and *chærophylla*, being quite plain. The last named plant grows only a few inches high, and is one of the very few Ferns of annual duration only. It will come very readily from spores; indeed, if it has once been grown in a Fernery, it will always be found in some corner or crevice during the summer season. Our British representative of the genus is also a diminutive annual plant, and destitute of any farinose clothing. The tropical species, to which I refer most particularly here, would appear to vary very much in their native localities, as I have seen plants from Jamaica only a few inches high gathered in exposed and dry situations, and the same species, gathered in more favourable spots, with large and beautifully-developed fronds. In cultivation, also, they are most variable, for plants, with almost any shade of gold and silver in the powder, are to be obtained from a batch of seedlings. They are very subject to produce forked and crested fronds, of which *G. Wattenhalliana*, and my new *G. Parsonsii*, are good illustra-

tions. They are plants of very easy culture, requiring good drainage, and a mixture of fibrous peat and silver sand, and even a little chopped sphagnum moss, with a liberal supply of water to the roots. These plants should be arranged in a group in some light part of the stove, where the water from the syringe never reaches them; for, on account of the farina so easily rubbing off, they will present a wretched appearance if they are ever sprinkled over head.

G. Calomelanos.—A very fine and strong-growing species. The fronds are bipinnate, from one to three or more feet in length, the stipes and rachis of a shining black, while at the base next the caudex they are covered with brown scales. The fronds are on the upper side dark green, on the reverse side silvery white, the whole under surface being covered with a white farinose powder. Native of the West Indies.

G. charophylla.—A lovely little Fern, making an elegant ornament in a Glass Case. It is peculiar on account of being one of the few Ferns known to be annuals, but as it fruits abundantly, and germinates very freely, no fear need be entertained of losing it, as when spring comes round it is sure to make its appearance in many parts of the Fernery or Case. The fronds are from six to ten inches high, divided into very fine segments, triangular in shape, pellucid, and very bright green in colour; sori light brown, covering the entire under surface in close lines. An elegant and interesting annual plant. Native of Brazil, Jamaica, &c.

G. chrysophylla.—This most beautiful Fern is deservedly a universal favourite. The fronds vary from ten inches to two feet in length; on the surface they are light green in colour, while the whole of the under side is densely

clothed with a rich golden yellow powder, through which the small black sori protrude, making a pleasing contrast. An evergreen stove Fern. Native of the West Indies.

G. chrysophylla Laucheana.—A beautiful Fern, and one that makes a good exhibition plant; it is a much taller grower than *G. chrysophylla*, and more dense in its habit, at the same time its fronds, which are gracefully arched, retain the bright golden colour quite as intensely as in that species, of which I believe it to be a garden variety.

G. chrysophylla Parsonsii.—A most beautiful variety, obtained from seed in this country. It retains all the beauty of the species, and, in addition, the apex of the fronds and every pinnae is densely and beautifully tasselled. This plant should be in every collection of tropical Ferns.

G. flexuosa.—This is a singular and beautiful species, though it lacks the farinose powder so prevalent in this family. It is of a scandent habit, much divided, the ultimate segments quite narrow. A good grower, and very distinct, so that it ranks among the most elegant of the genus. An evergreen stove species, from tropical America.

G. javanica.—This species produces its fronds from a decumbent rhizome, and is from one to three feet in height, bipinnate; pinnae and pinnules oblong lanceolate, from four to six inches long, and one and a half in breadth, glabrous, and light shining green in colour, with numerous broad stripes of yellow running across the pinnae, giving it a variegated appearance, and which has caused it to be named *C. striata* by many. A very handsome and distinct stove Fern, requiring for its proper development, an abundance of heat and moisture, and

should be potted in fibrous peat and sand. Native of Java, &c.

G. L'Herminieri.—This is a very pretty though not a strong-growing species. The fronds are triangular in shape, and bipinnate, about eight or ten inches in length, on the upper side pale green, on the under covered with farinose powder of a bright but light yellow colour. A delicate and rare species in cultivation. From Guadaloupe.

G. Pearcei.—An elegant free-growing species, entirely different from any other Fern with which I am acquainted. The fronds are from twelve to eighteen inches high, supported upon bright brown stipes; they are triangular in shape, and quadripinnate, most beautifully and finely cut, and dusted over on the under side with some white farinose powder. This gem amongst Ferns is a native of Peru.

G. Peruviana argyrophylla.—This very handsome plant is one that suffers by the fronds being wetted more than any other, on account of the dense farinose powder which covers its upper as well as its under surface. It makes a fine exhibition plant when well grown. The fronds are from ten to thirty inches in length, and broad at their base; the pinnules are also broad and obtuse. On the upper side the farinose powder is so dusted over it that any trace of green is quite lost, and it becomes bluish white; the under side is silvery white. A most desirable tropical species, well adapted for dinner-table decoration. Native of tropical America.

G. pulchella.—A very elegant species, and a good vigorous grower. The fronds are from six inches to upwards of two feet in length, and ten to twelve inches in breadth; the pinnæ are cut into very fine segments; the colour on the upper side is a bright dark green, and

on the under side silvery white. A stove evergreen species which deserves universal cultivation. From Venezuela.

G. rufa.—A very distinct plant, not resembling the other members of this genus much in appearance. The fronds are from six to twelve or eighteen inches long, erect, pinnate; pinnæ oblong and obtuse; stipes and rachis red; the whole plant tomentose. This makes a pretty specimen in a Wardian Case, and is also very ornamental in the Fernery. Native of tropical America.

G. sulphurea.—This is a beautiful dwarf-growing species, but rather delicate. The slender fronds are from six to twelve inches in length, bipinnate; the pinnæ are set rather distant, the upper surface being light green in colour, while the under is densely covered with a bright sulphur yellow farinose powder. A stove evergreen species, from Jamaica.

G. tartarea.—A handsome plant, producing fronds from twelve to twenty-four inches long, bipinnate; pinnæ lobed, with obtusely rounded lobes, dark green above, and clothed on the under side with a covering of silvery white farinose powder; sori black; stipes and rachis intensely black; the crown of the plant and base of stipes is covered with black chaffy scales. A distinct and highly ornamental species, from South America.

G. tomentosa.—This species somewhat resembles *G. rufa*, though the most cursory glance is sufficient to distinguish them from each other. In the present plant the fronds are invariably bipinnate, whilst in *rufo* they are as regularly pinnate only. *G. tomentosa* produces fronds from ten to twenty inches high, bipinnate, dark green in colour, and tomentose all over; stipes and rachis clothed with reddish brown hairs. It will succeed well

in the Wardian Case in the summer season. Native of Brazil.

G. trifoliata.—A remarkable stove plant, totally distinct from any other member of the genus. It grows from two to four feet high; the fronds are bipinnate; the segments trifoliate and linear, bright dark green above, the under side covered with farinose powder. There are two varieties of this plant, one having a white, and the other a golden, farinose powder on the under side. A stove evergreen Fern, from Jamaica.

G. Wettenhalliana.—A very remarkable and handsome garden variety, which, though not so strong growing, has somewhat the appearance of *G. pulchella*. The fronds are clothed beneath with a pale sulphur-coloured powder, and have a large eorymb on the apex, and dense crests at the points of all the pinnæ. A very desirable and interesting stove Fern.

GYMNOPTERIS.

The two species I have quoted of this genus are very dissimilar in appearance, and are well deserving cultivation. The largest kind should be potted in peat, loam, and sand, substituting sphagnum moss for the loam in the case of the smaller.

G. nicotianæfolia.—This is a stronger grower than the next species, and produces two kinds of fronds, both of which are pinnate. The sterile ones are reclining, the pinnæ broad, and bright light green in colour; the fertile erect, somewhat contracted, and from one to two feet high. An evergreen stove plant, from the West Indies.

G. quercifolia.—An interesting, distinct, and dwarf-growing species, having prostrate barren fronds some-

what like an oak leaf, about four inches long. The fertile fronds are very much contracted, halbert-shaped, erect, about six inches long; segments linear, and wholly sporangiferous, dark green in colour. This is a valuable little plant for Wardian Cases; it is easily grown, and has a character peculiarly its own: sometimes called *G. Neitneri*. Native of Ceylon.

HELMINTHOSTACHYS.

This genus is nearly related to *Botrychium*. Its only species is deciduous, and requires to be planted in the Fernery in places where it will not get injured or disturbed during the resting season; while care must be taken that the stout rhizome and roots do not become dry while dormant. Plant in loam and peat, with the addition of a little sand, and be careful that the drainage is perfect.

H. zeylanica.—A singular and handsome plant, producing fronds upwards of a foot long, the barren and fertile segments of which are very dissimilar. The sterile segments are digitate and pedate, each pinnule being about six inches in length and one in breadth, while the fertile ones are, as the name implies, produced upon rachiform and worm-like branches, forming a clustered spike of sub-globose sessile sporangia; colour of frond, dark green. A handsome and interesting deciduous species, but rarely to be seen in cultivation. Native of Ceylon, &c.

HEMIDICTYUM.

Only one species has at present been found to illustrate this genus, which is nearly allied to *Asplenium*. Its peculiar shade of colour and habit—throwing up its

pinnate fronds, with broad bold pinnæ, to the height of twelve and fourteen feet—makes it an attractive and very ornamental plant in the tropical house; it should be grown in a mixture of rough peat, loam, and sand, and requires an abundance of water at the roots during the summer season.

H. marginatum.—The only species in this genus; an evergreen stove plant of singular beauty, and noble appearance. The fronds are pinnate, from three to fourteen feet high; the pinnæ one to two feet long, and three to five inches wide, semi-transparent; colour, a lively green. In Ferneries of sufficient size it forms a splendid object from its distinctness of character. Native of tropical America.

HEMIONITIS.

The two species given of this genus are all I am acquainted with. They are handsome dwarf plants, of very easy growth, and admirably adapted for Wardian Cases, especially *H. palmata*. This species produces young plants at the base of the fronds, which makes it an interesting object; and, coupled with the beautifully reticulated lines of sori on the fertile fronds, causes it to be a general favourite with the lady-admirers of this tribe of plants. The plants require to be kept in small pots, peat and sand, with good drainage, being all that is necessary for them.

H. cordifolia.—A very distinct dwarf species, and admirably adapted for a Wardian Case; being so dissimilar, it makes a pleasing change in the general outline. Fronds simple, cordate, about six inches high, dark green in colour on the upper surface, paler below, and slightly hairy; sori black, and situated upon the reti-

culated veins, but eventually covering the whole under surface; fronds proliferous at their base, the fertile ones somewhat contracted. A stove Fern. Native of the East Indies.

H. palmata.—The Ivy-leaved Fern, an evergreen stove species, bearing young plants on its upper surface. The fronds are five-lobed, and covered on both sides, as well as the rachis and stipes, with a ferrugineous pubescence. With a liberal supply of water, this makes a very pretty and interesting plant. Native of the West Indies.

HEMITELIA.

This is a beautiful genus of Tree Ferns, and its species rank among the rarest of the arborescent kinds in cultivation; their large, broad, and shining fronds, when growing by the side of some of the more finely divided Ferns, have a splendid appearance in a tropical Fernery. The regularity of the round sori, which form a medial or intramarginal almost uninterrupted line round each pinule, adds materially to the beauty of the under surface of the fronds. They should be potted in a mixture of peat, loam, and sand, and an abundant supply of heat and moisture given during the growing season.

H. grandifolia.—A noble evergreen stove species, forming an arborescent stem from three to six feet high, from which are produced fronds six to eight feet in length, somewhat lanceolate in form, pinnate; the pinnæ ten or twelve inches in length; segments shallow, obtuse, and bright glossy green in colour. Native of the West Indies.

H. horrida.—This grand species forms a stem six to ten feet high, from which its splendid fronds are produced, to the length of nearly ten feet on large specimens;

they are bipinnate, broadly lanceolate in form; pinnae deeply pinnatifid; the pinnules are about twelve inches in length; the rachis and stipes scaly, and armed with long stout spines; colour of frond a brilliant green on the upper side, lighter coloured, and slightly tomentose on the under. This species, if allowed sufficient room, makes a noble and striking object in a warm Fernery. Native of the West Indies.

H. Karsteniana.—This remarkably fine and distinct species I have not seen of sufficient age to say what kind of stem it has. The fronds are very long and broad, pinnate; the pinnae are upwards of a foot long, and two inches in breadth, very obtusely lobed, and rich dark green in colour. An evergreen and beautiful species, at present very rare in cultivation. Native of Venezuela.

H. speciosa.—This fine species is pinnate. The pinnae are from ten to fifteen inches long, slightly serrated on the margins, and rich dark green in colour. The sori in this species are nearly or quite marginal; the crown of the plant, and the stipes at the base, clothed with long dark brown chaffy scales. A very handsome stove Fern. Native of tropical America.

H. spectabilis.—A very handsome Tree Fern, at present very seldom found in our gardens. The fronds are from twelve to eighteen feet long; pinnules obtusely lobed, from ten to fourteen inches in length, and two in breadth, colour a cheerful light green. A fine stove species. Native of Venezuela.

HUMATA.

A small family of Ferns having a close affinity with *Davallia*, but separated from that genus by some of our

best authorities. The species are all dwarf-growing handsome plants, well worthy of cultivation.

H. alpina.—This is a dwarf-growing stove Fern; fronds only a few inches in height, somewhat triangular in shape, bipinnatifid, and dark green in colour; it is a beautiful little plant to cover the face of a jutting rock in the Fernery, or for the Wardian Case. Native of Borneo.

H. heterophylla.—A very handsome creeping evergreen species, very suitable for suspending in a Basket, or for covering the face of rock-work. The barren fronds are about four inches in length, simple and oblong in shape; fertile frond very narrow and pinnatifid. Native of the Malay Islands.

H. pedata.—This is a very pretty evergreen stove Fern; the fronds are about five inches high, coriaceous and deltoid, bipinnatifid, of a dark green colour, and produced from a slender creeping rhizome. It makes a pretty object in the Fern Case, when climbing over a lump of sandstone. Native of Java, Penang, &c.

HYMENODIUM.

I am only acquainted with a solitary species belonging to this genus; it is sometimes called the Elephant's-ear Fern. It is a native of the West Indies, where it forms immense fronds; potted in peat and sand, and well supplied with heat and moisture, it will soon form a fine plant, contrasting with any and every other Fern. A very distinct species for rock-work in a Fernery, and also makes a fine distinct specimen for exhibition.

H. crinitum.—This is a very singular, and also a handsome Fern; the fronds are simple and entire, and rise from a decumbent rhizome, which is densely crinite, the whole surface and margin of the fronds being covered

with long black hairs. The sterile ones are eighteen inches in length, and nine in breadth, and the footstalk is about eight or nine inches long. The fertile ones are a little smaller, and the sori occupies the whole of the under side; colour dark green. Native of the West Indies.

HYMENOPHYLLUM.*

H. abruptum.—A pretty dwarf pinnatifid species from the West Indies: it succeeds best in a rather cool and shady place, grown upon a block, or stump of a Tree Fern.

H. ceruginosum.—A pretty tomentose bipinnate species from New Zealand, requiring to be grown on a log of wood; it should have no water over the fronds. The plant grows from six to eight inches in height, and succeeds well in a Wardian Case.

H. asplenoides.—This will succeed under the same treatment as *H. abruptum*; it is a dwarf-growing plant, with small wiry rhizomes; fronds deeply and obtusely lobed, and dark green in colour. From the West Indies.

H. bivalve.—A rare species, growing about eight inches high, with much divided fronds, which are serrated on the edges; it may be grown in a pot. Native of New Zealand, where it is scarce.

H. caudiculatum.—A broad-fronded species, with the ends or points of the pinnules lengthened out like tails; it grows about eight inches high, and is rather thicker in texture than many others, and of a very dark green; it succeeds best in fibrous peat and moss. Native of Brazil.

H. ciliatum.—A handsome free-growing sub-bipinnate species, slightly hairy; it grows well on stems of Tree Ferns, and will succeed on a mound of turfy peat and

* For cultivation, see Filmy Ferns, page 19.

moss. This is a real gem when grown in a Glass Case. Native of the West Indies.

H. crispatum.—A very nice species from New Zealand, admirably adapted for a Fern Glass; the rachis is winged to the base, and the edges everywhere wavy; the fronds are triangular in shape, and attain the height of six to ten inches. It requires the same treatment as the other species from the same country.

H. demissum.—A very handsome plant. The fronds are tripinnate, of a lively green colour, with the segments finely divided, and grows about a foot high: it is a good companion for the Killarney Fern. Succeeds well in a pot with peat, moss, and broken sandstone, and produces a beautiful effect in a Fern Case. Native of New Zealand.

H. dilatatum.—One of the noblest plants of the genus, growing from six to eighteen inches in height, with broad lively green fronds, which are tripinnatifid; it requires the same treatment as the preceding. From New Zealand.

H. flabellatum.—This beautiful species is from Tasmania; it has finely divided fan-shaped fronds, which vary much in length and breadth. Having a scandent rhizome, it succeeds best on the stem of a Tree Fern or on a log of wood; it is also well suited for a Wardian Case.

H. flexuosum.—This plant resembles *H. crispatum* in habit and appearance, but is more crisped; the fronds attain to the height of eight or ten inches, and are tripinnatifid, and dark green in colour; it does well in a Fern Case. From New Zealand.

H. hirsutum.—A dwarf-growing, pretty, scandent species, with wiry thread-like rhizomes, producing pale woolly fronds a few inches high. It must not be watered over the fronds, and succeeds best on a block of wood or a lump of sandstone. Native of the West Indies.

H. hirtellum.—A fine species from Jamaica, with tripinnatifid fronds, which are downy; it is something like *H. ciliatum*, but stronger, as it attains to the height of ten or twelve inches, and succeeds well in a mixture of peat, sphagnum, and broken sandstone.

H. Plumieri.—This very fine variety is a native of the West Indies and Brazil; it requires to be kept very moist, and a little warmer than the generality of the species. The fronds are about eight inches long, serrated on the margins, and dark green in colour.

H. polyanthos.—This species is very widely distributed. The form I have seen in cultivation is from New Zealand, and does not require to be kept so close as most of the others; the fronds are tripinnatifid, about eight inches high, and from one to two and a half wide, and bright green in colour. It makes a beautiful object on a block of wood, either in the cool Fernery or a Wardian Case.

H. pulcherrimum.—This, as its name implies, is a very handsome species, and requires to be kept very moist. The fronds are tripinnate, from six to ten inches long, and bright lively green in colour. Native of New Zealand.

H. rarum.—A pretty close-growing plant, widely distributed. The fronds are produced from a wiry rhizome, and are only a few inches high; it requires to be grown on a Tree Fern stem or on a block of wood. Native of New Zealand, &c.

H. scabrum.—A really fine species. The fronds attain to the height of twelve or fifteen inches, and are finely divided; it requires a liberal supply of air and plenty of moisture, and thrives well in a pot, either in the house or Wardian Case, with fibrous peat, moss, and small lumps of sandstone. From New Zealand.

H. sericeum.—This species, which grows upon rocks in the shade in its own country, hanging down and covering them like a veil, should be grown here upon a lump of sandstone, giving it plenty of moisture, but it should not have its woolly fronds wetted much. The fronds are long, narrow, and pendant, from ten to twenty inches long, pinnate, the pinnæ being covered with a silky whitish down. It is a beautiful plant, but generally difficult to get established when imported. Native of the West Indies.

H. tunbridgense.—The Tunbridge Filmy Fern is rather difficult to manage in cultivation, though I have seen splendid masses of it in several collections. It is a dwarf, compact, and elegant little plant, requiring plenty of shade and moisture, and a liberal supply of air; it succeeds well upon a Tree Fern stem, or on blocks of sandstone, or turfy peat and decayed leaf soil. I have seen it growing beautifully in a wild state in many parts of the kingdom. Fronds about six inches long, rich dark green in colour, pinnate; segments pinnatifid.

H. unilaterale.—The Scottish Filmy Fern differs from the former in being longer and more rigid in its growth; fronds pinnate, deep green in colour, about four inches in height, and requiring the same treatment as the preceding species. It is called by many *H. Wilsoni*.

HYMENOSTACHYS.

This genus has been established for this plant on account of the fructification being on spikes, and the veins in the barren fronds being reticulated; it requires precisely the same treatment as the other Filmy Ferns, and to be potted in peat, moss, and small lumps of sandstone.

H. elegans.—A distinct and handsome plant, producing

a narrow flat fruiting frond, with the spore-cases sunk in its margins; the barren fronds are from four to eight inches high, pinnatifid, and proliferous at their apex: a most desirable and beautiful species. Native of the West Indies.

HYPODERRIS.

This genus is distinguished from *Woodsia* only by its reticulated venation; the indusium is attached in a similar manner. Some authorities attach more importance to the venation than others, for the formation of genera; but in this case the general habit of the plant would assist, I think, in distinguishing it from *Woodsia*. It requires to be potted in good fibrous peat and sand, and enjoys abundance of heat and moisture.

H. Brownii.—A very rare Fern in cultivation. The fronds are from ten to twenty inches high, sometimes simple and entire, and of a bright light green colour. When properly developed they are three-lobed, the centre lobe being more than double the length and width of the other two; the stipes and rachis are slightly scaly at the base. A distinct and handsome evergreen stove plant. Native of Trinidad and Guiana.

HYPOLEPIS.

Handsome free-growing Ferns, with ereeping rhizomes, very ornamental in the temperate Fernery or Wardian Case. They are very easily cultivated, thriving best in rough peat, with good drainage, and require an abundant supply of water.

H. distans.—A very elegant species for growing in a Fern Case, and also very valuable for cutting for bouquets. The fronds are from six to twelve inches long, bipinnate;

the pinnules serrate on the margins, and of an intense green in colour. An evergreen cool house Fern, which deserves to be generally cultivated. Native of New Zealand.

H. tenuifolia.—This is a very handsome and distinct plant, growing from one to two feet high, having the fronds divided into very fine segments, and of a cheerful bright green colour. A very desirable evergreen greenhouse species, of bold and striking habit, from New Zealand and the Polynesian Islands.

LASTREA.

A handsome and extensive genus, including many very ornamental species, with simple, forked, or pinnate veins, and reniform indusia. In it can be found plants suitable for the open air Fernery, the temperate or tropical house, or the Wardian Case. It is a genus which is also well represented in our own islands, and is of easy culture. The soil best adapted for the large kinds is a mixture of equal parts of loam and peat, with a little sand; for the smaller-growing species the loam should be in smaller quantities, and more sand added.

L. albo-punctata.—A very pretty and distinct Fern, producing erect pinnate fronds, having the pinnæ deeply pinnatifid, dark green in colour, and spotted on the upper surface with small white dots, giving it a singular appearance. An evergreen stove species, from the Mauritius.

L. chrysoloba.—A beautiful Fern, rare in cultivation. The fronds grow from ten to fifteen inches in height, and are pinnate; pinnæ pinnatifid, bearing large and bright reddish brown sori. An evergreen stove species, from Brazil.

L. decomposita.—This is a very handsome and easily

cultivated species, making a pretty specimen either for a Wardian Case or the cool Fernery; the fronds are decompound, about twelve inches high, and dark green in colour. Native of Australia, Tasmania, &c.

L. decurrens.—A beautiful Fern for a Wardian Case, and entirely distinct from any other with which I am acquainted: the fronds are pinnate in the lower, and pinnatifid in the upper part, lanceolate, about three inches broad in the widest part, and pale green in colour; the sori are numerous and reddish brown. An evergreen species from China.

L. deltoidea.—This is a very singular and beautiful species, growing from ten to fifteen inches high, though I have seen native-grown specimens upwards of thirty. The fronds are pinnate nearly to the base; the first ten or twelve pairs of pinnae reduced in size, measuring only about a quarter or half an inch in length, the remainder being from two to three inches long, nearly one in breadth, and obtusely lobed; colour bright dark green. A very desirable evergreen stove species. Native of Jamaica, &c.

L. elegans.—A fine species, well deserving the name; it grows from one to two feet high, having decompound fronds, of a bright green colour, and beautifully arched; base of the fronds scaly. An evergreen stove Fern. Native of Ceylon.

L. erythrosora.—This is a fine addition to our hardy Ferns. The fronds are bipinnate; pinnae broad, light green in colour, and from one to two feet in length; sori large, and the indusium which covers them of a bright light red colour, giving the under surface a handsome and distinct appearance. Native of Japan.

L. glabella.—This is an exquisite species, admirably

adapted for a Wardian Case or the cool Fernery. It grows from six to fifteen inches high when well encouraged, but often makes, with its finely divided fronds, a beautiful little specimen about seven or eight inches high. An evergreen cool house plant, which should be in every collection. Native of New Zealand.

L. Goldiana.—This is a fine hardy Fern. The fronds are bipinnate, from one to three feet high; pinnæ broad, from three to six inches long, and of a rich dark green in colour; base of stipes scaly. A very desirable species for the hardy Fernery, from the United States and Canada.

L. hirtipes.—A fine species, which thrives well in either the tropical or cool Fernery. The fronds are from one to two feet in height, pinnate, serrate on the margins, and dark green in colour; sori large and conspicuous; stipes clothed with large dark coloured chaffy scales. It is also known by the name of *Aspidium atratum*. Native of the East Indies.

L. hispida.—A lovely little Fern, which should be in every collection. It is admirably adapted for the Fern Case, and also forms a beautiful object either in a pot, or planted in the cool Fernery. The fronds are about twelve inches long, triangular in shape, and rich dark green in colour, tripinnate, the pinnules dentate on the margins. The crown of the plant and stipes densely clothed with very long black hairs. Native of New Zealand.

L. intermedia.—A fine strong-growing hardy Fern. The fronds are about two feet in height, bi-tripinnate; pinnæ toothed on the margins, and fragile in texture; the stipes furnished with broad light coloured chaffy scales. A very desirable plant in the out-door Fernery. Native of North America.

L. invisæ.—In a large Fernery this is an invaluable plant, on account of its robust growth and habit, which give quite a tropical appearance to a house; it attains the height of four and five feet, about two of which are bare. The fronds are lanceolate, bipinnatifid, or pinnate, with the pinnules pinnatifid, about twenty inches broad in the widest part, and of a cheerful light green colour. An evergreen species, from the West Indies.

L. marginalis.—A fine hardy species, the fronds of which are bipinnate, from fifteen to twenty-four inches long, and bright dark green in colour; the pinnules somewhat triangular and sessile, with the sori placed almost close to the margin; stipules scaly. Native of North America.

L. patens.—This is a distinct strong-growing kind, making a fine ornamental species when planted out in the stove Fernery. The fronds are from one to three feet in height, pinnate; the pinnæ five inches long, deeply lobed, auriculate at the base, and brilliant green in colour. A very desirable plant. Native of tropical America.

L. Sieboldii.—A fine and distinct hardy species, from one to two feet in height, dark green in colour, pinnate; pinnæ few, six inches long, and one broad; sori bold and copious, dark brown in colour. A beautiful Fern for the out-door rock-work, and known to many as *Pycnopteris Sieboldii*. Native of Japan.

L. sparsa.—A noble-habited and distinct Fern. The fronds are about two feet in height, bipinnate; pinnæ five to six inches long; pinnules broad and lobed, dark green in colour; base of the fronds clothed with large cinnamon coloured chaffy scales. A most desirable species, found in various parts of India, Ceylon, and Java.

L. Standishii.—This is a beautiful species for the hardy Fernery; it was formerly known in gardens under the name of *Polystichum concavum*. It grows about two feet in height, and has the pinnæ and pinnules closely set and numerous, giving the fronds a massive and beautiful appearance; the colour is a rich green. It forms a very handsome spreading mass in a cool house. Native of Japan.

L. strigosa.—A rare and beautiful Fern, well deserving a place in every collection. The fronds vary from ten to fifteen inches in height, pinnate; pinnæ two inches long, divided nearly to the rachis, and light green in colour; stipes clothed with jet black hairs, which are longest near the crown of the plant. A tropical species, from the Mauritius.

L. varia.—A beautiful Fern, known in some gardens by the name of *L. opaca*. I believe this will prove perfectly hardy, and a valuable addition to our out-door Ferneries. It is a robust species, growing from ten to twenty-four inches in height; fronds broad and much divided; the lower pinnæ six or seven inches in length; the colour is a very dark green; the sori prominent and black; stipes and rachis copiously clothed with black scaly hairs. From China and Japan.

L. vestita.—This splendid Fern is deserving of a place in every Fern house: it grows from twenty to thirty-six inches or more high, and is broadly lanceolate in form, bipinnatifid, the pinnæ being six inches long, and the segments obtuse and divided to the rachis; stipes clothed throughout the entire length with a dense covering of long cinnamon coloured hairs. An evergreen Fern, from the West Indies and Brazil.

L. villosa.—A majestic Fern, fit to associate with the

arborescent kinds. The fronds are tripinnate, dark green in colour, six feet long ; pinnæ upwards of two feet, villose ; pinnules deeply pinnatifid, and six inches in length ; the stipes as stout as an ordinary walking-stick, and entirely hidden by a dense covering of large dark brown chaffy scales. An evergreen stove Fern, from the West Indies.

LINDSÆA.

This is a lovely genus, but up to the present time most of the species have resisted all our efforts to make them general inhabitants of our stoves ; frequently as importations have arrived, just as frequently have they died. Now, however, we are reaping the fruits of perseverance, by seeing some of these plants, which I think are looked upon as precious gems by all lovers of Ferns, becoming established in cultivation. There has, I am afraid, as a rule, been too much solicitude in preparing the soil, and in potting, in the case of these plants. Had they been taken from the Cases upon arriving in this country, and placed in pots nearly filled with drainage material, with just a rough piece or two of turf to hold them fast, they would, in all probability, have been established long ago ; for, flourishing as they do naturally in open grassy glades, under the shade of large forest trees, or in barren waste places, either in woods or on their margins, their rhizomes creeping in and about a poor stony soil, frequently drenched with rain, but which is always carried away directly, leaving nothing to stagnate about them, it is evident that the treatment they have generally received at home could lead to nothing else than speedy death. I should advise very little soil to be used in the culture of these plants, but that should



LINDSÆA CULTRATA. *Spr.*

East Indies.

be a mixture of turfy loam, fibrous peat, and sand. They are plants that revel in a humid atmosphere, and if the air of the open Fern house is too dry, let them be removed into the division set apart for the Filmy Ferns, taking care that the soil does not become very wet. The genus consists, for the most part, of *Adiantum*-like plants, rising, in some instances, over two feet high; their stems, however, are light-coloured, and have not that black polished appearance so common to that genus; neither have they, like it, the property of resisting water when poured upon them. There are many handsome species to be found in the East Indian Islands, and various other parts of the world, which I should very much like to see flourishing in our Ferneries at home.

L. cultrata.—This elegant little species is now to be met with in many good collections. It is a pinnate plant, growing from three to eight inches high; the pinnae are dimidiate, in some instances opposite, but more frequently alternate; the margins are lobed, and light green in colour. This pretty Fern yields a perfume something like the sweet-scented vernal grass (*Anthoxanthum odoratum*), a property which it retains in the herbarium for many years. An evergreen species, which will grow in the open Fern house if a fair amount of humidity is kept up. Native of the East Indies.

L. falcata.—A fine species, which requires a humid atmosphere to grow it to perfection. The fronds are pinnate, and, I believe, about a foot high; the pinnae are oblong, obtuse, and very much hooked; in colour a brilliant green. An evergreen stove Fern, from Guiana.

L. guianensis.—This beautiful Fern has been frequently introduced to our gardens, and I hope has now become

thoroughly established: the fronds are about twelve or fifteen inches high, bi or tripinnate; pinnæ oblique and obtuse; sori uninterrupted; colour bright green. An evergreen species from Guiana and the West Indies.

L. reniformis.—For this extremely rare Fern we are indebted to Messrs. Backhouse, of York, they having introduced it to this country, along with several other species. It resembles *Trichomanes reniforme*, and *Adiantum reniforme* in general appearance, the three making a happy trio. An evergreen stove plant. Native of Guiana.

L. stricta.—This is an exceedingly neat and elegant species, assuming several forms, all of which are very handsome; it grows from six to twelve inches high, and is sometimes simply pinnate, and in this state often called *L. botrychioides*; at another time it is bipinnate, the character most usual to it, but I have not unfrequently seen it assume a tripinnate form. In all of them it is a most desirable plant; the pinnæ are developed on one side of the costa only, recurved, sometimes becoming almost lunulate. An erect-growing evergreen Fern, from Venezuela, Trinidad, &c.

L. trapeziformis.—A beautiful species, producing broad spreading fronds upwards of two feet high, bipinnate; the pinnæ six to eight inches long; pinnules developed on one side only, broad, obtuse, somewhat falcate, and in colour a most brilliant green: the most ornamental and handsome species with which I am acquainted. An evergreen stove Fern, from Brazil, Trinidad, and various West Indian Islands, &c.

L. trichomanoides.—This is a distinct and handsome little species. I have not seen it larger than about six inches in height. The fronds are bipinnate; the pinnæ

lobed, and bright green in colour: a charming pot plant for the temperate house, and also makes a pretty little specimen for the Wardian Case. Native of New Zealand.

LITOBROCHIA.

A genus containing many very highly decorative plants, in most instances of free growth, and, in the case of *L. podophylla*, rising eight or nine feet in height. They were formerly classed with *Pteris*, but are easily recognised from that genus by their reticulated or netted veins. The soil best adapted for the robust kinds is a mixture composed of equal parts of loam, peat, and sand, with the pots well drained; for the more delicate species, less loam should be used. Some of the smaller kinds make good plants for Wardian Cases, and their fronds are very useful for bouquets.

L. denticulata.—A very handsome and distinct kind, growing from ten to twenty inches high. The fronds are pinnate; pinnæ decurrent, and deeply serrated at the points, the lower ones usually bifid; sori marginal; colour of fronds bright green. An evergreen stove species. Native of Brazil.

L. grandifolia.—A very robust-growing Fern, only suitable for planting out in the tropical house, but there it has a splendid effect. The fronds are from two to five feet high, pinnate; pinnæ twelve inches long, an inch and a half in breadth, and bright green in colour. Native of tropical America.

L. leptophylla.—This is a very elegant species, admirably adapted for Wardian Cases. The fronds are from ten to fifteen inches high, bi or tripinnate; segments narrow, bright green, the red marginal sori being very

ornamental to it: an evergreen Fern which should be in every collection. Native of Brazil.

L. macilentia.—A most desirable Fern for the cool house or Wardian Case. It also lasts a long time in water after it is cut, which makes it valuable for decorating the dwelling-house, when associated with flowers. The fronds are from one to three feet in height, bi or tripinnate; lobes of the pinnules beautifully serrated. An evergreen cool house species which is deserving general cultivation. Native of New Zealand.

L. macroptera.—A handsome and distinct species from Brazil. The fronds are bipinnatifid, from ten to twenty inches high, bright dark green in colour. A desirable stove evergreen Fern. Native of Brazil.

L. podophylla.—This gigantic species is a fit companion for the arborescent kinds: the stipes are as stout as a thick walking-stick, and five feet in height, bearing upon the top a large tripartite frond; the segments are pinnatifid, and of a most intense green colour. A stove Fern, which should find a place in every house of sufficient dimensions. An evergreen and highly ornamental species. Native of the West Indies.

L. spinulifera.—This magnificent species makes a very ornamental plant in the stove Fernery. It grows from one to three feet in height; fronds pinnate; pinnules pinnatifid, eight inches long, and three broad, bright shining green in colour; stipes spiny the entire length. An evergreen Fern, well worthy of general cultivation. Native of West Africa.

L. tripartita.—A fine ornamental stove Fern: fronds from one to three or more feet high, tripartite; pinnæ two feet long; pinnules deeply pinnatifid, the apex of each lengthened into a tail; colour vivid green; stipes

smooth and shining, reddish brown in colour. Native of the East Indies.

L. vespertilionis.—This beautiful and distinct Fern grows from ten to thirty inches in height. The fronds are bipinnate, the lower pinnæ seven inches long; pinnules sessile, and obtusely lobed, the two next the stipes eared, or wing-like; colour bright green, on the under side very glaucous; the sori marginal and bright red. An evergreen species, which is well worth general cultivation, succeeding in either house. It lasts a long time in water after being cut, and is a charming addition to a Wardian Case. Native of the East Indies, Australia, &c.

LLAVEA.

L. cordifolia.—This, the only species I am acquainted with, is very singular and beautiful at the same time. The fronds are tri-quadripinnate, from one to two feet long, the upper part contracted and fertile; pinnæ linear, sterile below; pinnules oblong, about an inch in length and light green in colour; the fertile portion is pendulous, and has the appearance of a collection of catkins. It requires moderate heat only, and should be potted in peat and sand, with an abundance of drainage. An evergreen species, forming a very handsome plant in the temperate house, if planted upon the summit of some projecting rock. Native of Mexico.

LOMARIA.

A beautiful and, in a decorative point of view, extremely useful family of Ferns. Many of the species are not to be equalled for dinner-table decoration, and, on account of the majority of them having fronds of a good substance, they are invaluable for the decoration of the conservatory, hall,

or even out-doors, in shady places. The genus is an extensive one, comprising many species well suited for contrasting with other Ferns, either in the tropical or cool house; and many more fine kinds have yet to be introduced to our gardens. To grow these plants well, the large-growing kinds require to be potted in a mixture of loam and peat, with some silver sand; for the smaller kinds, little or no loam should be used. Many of them will do for Glass Cases, and may be planted with advantage in nooks and corners of rock-work; in the Fernery their presence will help to vary the forms of foliage. Some of the *Lomarias* thrive well planted on the tops of the dead stems of Tree Ferns, say from one to three feet high; they will root down the stem into the pot, and soon get established; *L. gibba* and *nuda* are among the best to be grown in this way.

L. alpina.—This is a very dwarf-growing compact plant; it is hardy, and makes a beautiful object if planted in crevices of the rock-work, in the open air or in the cool Fernery. The barren and fertile fronds are distinct, and are produced from a creeping rhizome; the former are pinnate and broadly lanceolate, the latter similar, but very much contracted; it grows from four to six inches high, and is of a bright dark green colour. This species is perfectly hardy, and succeeds admirably in the open Fernery. Native of New Zealand, &c.

L. attenuata.—A beautiful and distinct species, growing from ten to twenty inches in height. The sterile fronds are pinnatifid, their pinnæ from four to six inches in length, very dark green in colour; the fertile fronds resembling the sterile, but the pinnæ are contracted and wholly sporangiferous. A very desirable and evergreen tropical species. Native of the Mauritius.



LOMARIA CILIATA. *Moore.*

New Caledonia.

L. australis.—A very handsome evergreen cool house Fern. The fronds are pinnate; the pinnæ lanceolate and obtuse; the fertile pinnæ are longer, very much contracted, or linear, of a bright dark green colour, and from ten to twenty inches long. Native of South Africa.

L. blechnoides.—This very pretty Fern grows from five to ten inches long; it is coriaceous in texture, dark green in colour, and pinnatifid, the pinnæ short and blunt. The fertile frond is contracted, but sometimes only its upper portion. It makes a beautiful, distinct, and handsome Fern for a Wardian Case, and also for planting in the rock-work of a cool Fern house. An evergreen species, from Chili.

L. capensis.—This is a strong-growing evergreen plant, well suited for a cool Fernery; the plant is of large dimensions, the fronds rising to the height of two and three feet, pinnate and lanceolate, the fertile ones contracted very much, and of a very deep green colour. A most desirable evergreen species. Native of South Africa.

L. chilense.—This is a majestic Fern, and one that will, I hope, prove hardy. I have seen it on some rock-work in the open Fernery, where it had stood for some time, and its appearance was very fine; the fronds were arched, and from four to six feet long—the usual length is, however, one to two feet—pinnate, dark green in colour; fertile pinnæ much contracted. A fine species which should be generally cultivated. Native of Chili.

L. ciliata.—A very distinct and handsome species, rising upon a slender stem to the height of a foot or more. The fronds are pinnate, or pinnatifid; the segments præmorse, and fringed with hair-like teeth; fertile fronds very much contracted; colour a cheerful light green.

A very ornamental and desirable cool stove plant. Native of New Caledonia.

L. discolor.—This is a beautiful species, making a stout short stem with age. The fronds are pinnatifid, the fertile ones wholly contracted, so as to form linear pinnae; sometimes, however, they are only partially contracted, with the base auriculate, which gives them a very peculiar and unique appearance. The fronds are from one to two feet in length, and in colour a bright dark green above, paler beneath. A greenhouse evergreen species which should be in every collection. From New Zealand.

L. dura.—A very fine new species, which has been also named *L. rigida*: we, however, take the first published name. It is a fine sturdy-growing plant, of a deep green colour; the fronds are from six to ten inches high, and one to two inches broad, pinnatifid, and lanceolate in form, erect, rigid, and very thick in texture. a fine addition to our evergreen cool house species. Native of the Chatham Islands.

L. elongata.—A noble and distinct Fern from New Zealand. It has not grown to any great size in this country, and I am unable to say to what height it may attain; as I have seen it, the fronds are from fifteen to eighteen inches high, pinnatifid, divided nearly down to the rachis; the pinnae are four inches long, and one and a half broad, the lower ones small, and forming a wing down the stipes; colour dark heavy green. It will, I have no doubt, prove a valuable acquisition for a cool house.

L. fluviatilis.—This is a very distinct and beautiful Fern. The fronds are from twelve to twenty-four inches long, pinnate; the pinnae roundish and alternate, with

a profusion of reddish chaffy hairs upon them, and the rachis is also densely clothed with the same; well suited for a Wardian Case or cool Fernery. An evergreen cool house species. Native of New Zealand.

L. Fraseri.—A most charming little tree, with graceful feathery fronds, in appearance somewhat like the Ostrich Fern (*Struthiopteris*). The fronds are bipinnatifid, six to twelve inches long, and, when fertile, densely covered with the bright red sori. This is one of the most elegant Ferns in cultivation. Native of New Zealand.

L. Germainii.—This is a very pretty addition to our cool house dwarf-growing Ferns, found in gardens sometimes under the name of *L. crenulata*. It produces fronds from three to nine inches high, light green in colour, and pinnate; pinnæ sessile, obtuse, and crenulate. The fertile fronds are generally longer than the sterile, and much contracted; base of the stipes clothed with broad light brown chaffy scales. It is very easy of propagation, and, if planted in the Fernery where it can creep underground, it will soon make a beautiful mass, and will likewise thrive well in a Fern Case. Native of Chili.

L. gibba.—A fine species, and very useful for decorative purposes. The fronds are produced from a slender stem, and are from six inches to two feet in length, deeply pinnatifid. This makes a splendid specimen for exhibition purposes, the plant being so regular in growth, and so perfectly distinct from any other; it also makes a pretty object planted out in the cool Fernery, in a position where you can look over it, as the centre of the plant forms a sort of flat table. In the young state it is also invaluable for dinner-table decoration. The plants thrive in a cool house, but will not endure frost. Native of New Caledonia.

L. Gilliesii.—This is a very distinct plant; an evergreen

cool house Fern. It forms an upright stem, from which rise the pinnate fronds to the height of one or two feet; the fertile fronds are also pinnate, but very much contracted. It frequently happens that only half of each pinnæ is contracted, giving the plant a very singular appearance. Native of Chili.

L. lanceolata.—A very pretty, compact-growing, dwarf greenhouse evergreen kind, with smooth lanceolate pinnatifid fronds, rising to the height of about eight or ten inches; the fertile fronds are pinnate, dark green in colour. Native of New Zealand, Australia, and Tasmania.

L. L'Herminieri.—This is a very handsome stove species, by no means common in collections. The fronds are pinnatifid, from six to ten inches in length, and of nearly the same width in the upper part, the basal pinnæ much attenuated; when young they are of a beautiful crimson hue, changing, with age, to dark green. Native of tropical America.

L. magellanica.—A fine, bold, and handsome-growing plant, rising, as it gains age, upon a short stout arborescent caudex. The fronds are from one to two feet long, very dark green in colour, and pinnate; the pinnæ are large, thick, and somewhat lanceolate in form; and the stems are very scaly near the base, as also is the crown of the plant. A splendid ornament to the greenhouse Fernery. Native of the Falkland Islands, Chili, and Juan Fernandez.

L. nigra.—This is a very distinct dwarf-growing species. The fronds are from three to six inches long, and of a deep blackish green colour, pinnatifid at the base; the round obtuse pinnæ are divided nearly to the rachis, but the upper part of the frond expands into a broad slightly lobed terminal pinnæ; fertile fronds smaller

and much contracted; stipes densely pubescent. A very interesting species for planting in the crevices of the rock-work in the cool Fernery, or for growing in the Fern Case. Native of New Zealand.

L. nuda.—A very handsome greenhouse species. The fronds are pinnatifid, broadly lanceolate, the fertile ones not so much contracted as in many kinds, but densely covered with the sori; they are light green in colour, and are from nine to twenty inches in length. A valuable species for the decoration of the dinner table. Native of Tasmania.

L. nuda var. *pulcherrima*.—This is a beautiful variety of the former, in which the apex of each pinnæ becomes somewhat crested, or again pinnatifid. It is in every other respect like *L. nuda*, and is an exceedingly handsome variety, and very rare.

L. onocleoides.—Very distinct in habit, often rising upon a slender stem of ten or fifteen inches in height. The fronds vary from ten to thirty inches in length, and from three to five in breadth, pinnatifid; the pinnæ upwards of two inches in length, broad at the base, bright dark green in colour, and thin in texture. The fertile fronds vary very much, being sometimes wholly contracted and sporangiferous, sometimes the lower part only, while the upper part is as broad as in the sterile parts; in other cases, some of the pinnæ in the middle of the frond become fertile, as in the case of *Osmunda interrupta*. A beautiful evergreen stove species. Native of the West Indies.

L. Patersoni.—This species is very distinct, the fronds being simple, about a foot long, and narrow, and the fertile ones so much contracted as to become linear; they do, however, sometimes branch under cultivation, and be-

come pinnatifid. An evergreen cool house species, from Australia.

L. procera.—A noble evergreen cool house species, which should be in every collection; its fronds are from twelve to twenty inches high, pinnate, three inches long, and one in breadth, somewhat obtuse, coriaceous, and thickened at the margins; the pinnæ four inches long and acuminate; colour dark green. The pinnæ of the fertile fronds are linear, and wholly sporangiferous; base of the stipes scaly. A massive and stately evergreen species. Native of Australia, Tasmania, and New Zealand.

L. vulcanica.—A very distinct and handsome Fern, suitable for the cool Fernery or a Wardian Case. The fronds are from five to ten inches high, dark green in colour, pinnatifid, and lanceolate; pinnæ from an inch to an inch and a half long, obtuse, the lower pair shorter and auriculate. The fertile fronds are similar to the sterile, but much contracted, and wholly sporangiferous—except the lower pair, which are, in most cases, destitute of sori and auriculate; base of stipes clothed with black chaffy scales. Native of New Zealand.

L. zamiioides.—This may be but a variety of *L. magellanica*, but it is an extreme form, and well deserving to be known by a distinct name in cultivation. It produces a thick arborescent caudex some four feet high, with fronds which are very *Zamia*-like in form, about two feet in length, of a light green colour, and pinnate. An evergreen stove species, from Brazil.

LYCOPODIUM.

The Club Moss family contains many beautiful species, which would be highly prized were they to be introduced

in a living stato to this country, though, it must be acknowledged, they have hitherto proved somewhat difficult to establish, even when they have reached us alive. A better knowledgo of their habits and habitats, however, is producing beneficial results, and many fine kinds are now established in the hands of cultivators. Many of the members of this family are found growing upon trees, adhering by a mass of fibrous roots, and throwing their branches downwards. One of the great mistakes, consequently, in our cultivation has been endeavouring to make them grow erect, as though we wished them to rival their fossil relatives, the *Lepidodendra*, which must have been as large as the majority of Coniferous trees. Having failed in these efforts, plant growers are now treating them as epiphytes, and agreeing to be satisfied if they can but have them in this country as they appear in their native woods. Several beautiful species are now to be seen decorating our Ferneries, the result of this reasonable and rational treatment. The soil best suited for these plants is rough spongy peat and sphagnum moss, but it should be applied sparingly, for if much soil is put round their roots it is apt to become sour, and cause the plant to rot off at the ground level. Many of the kinds from temperate regions would make beautiful plants for Wardian Cases, a purpose for which our native species are well adapted; indeed, I have seen these thriving better in a structure of this kind than anywhere else under cultivation.

L. cernuum.—This fine species is distributed throughout the tropics of both hemispheres, and, as may be supposed from such a variety of habitats, varies very much in appearance; the variation, however, is principally

in the height and density of the branches, the general appearance being the same. The stems are from eight to thirty inches high, the branches many times divided, and the leaves distant, somewhat needle-shaped, and bright light green in colour. In a fertile state, the plant has a beautiful appearance, for on the end of all the divisions of the branches the sporangia are gathered together in small pendulous hirsute catkins, about a quarter of an inch long, and light brown in colour. It is a terrestrial stove species that has not taken very kindly to artificial treatment, the failures arising from its not having proper soil; it should have a mixture of loam, peat, and limestone—fully one half of the latter—and be well drained; for though delighting in abundance of moisture, it must be quickly carried away.

L. dendroideum.—This very pretty species is perfectly hardy, and when growing vigorously, is somewhat like a miniature spruce fir, six to ten inches high. Native of North America.

L. densum.—A very handsome kind, producing from its creeping stolons erect slender stems, much branched, and densely furnished with short sharp pointed leaves, bright green in colour. An evergreen terrestrial greenhouse plant. Native of Australia.

L. Hookerii.—A fine noble-growing species, attaining the height of two or more feet. The leaves are of a bright shining dark green colour, and nearly an inch in length. Towards the base the stem is several times divided, and on the end of each division hangs a bunch of slender catkins, from three to five in number, also branched, and some four inches long, bearing the sporangia, giving the plant a very pleasing and novel ap-

pearance. An evergreen epiphytal stove Lycopod, requiring to be grown in peat, and suspended so that the plant hangs downwards. Native of the East Indies.

L. Phlegmaria.—This handsome plant bears a strong resemblance to the preceding, but as far as I have seen is not nearly so strong in any of its parts: the contracted fertile catkins give the plant a beautiful tasselled appearance, even more elegant than *L. Hookerii*; it requires the same peculiar treatment as that species. A stove evergreen epiphyte. Found throughout the tropics of the Eastern Hemisphere.

L. scariosum.—A lovely species for the cool Fernery; indeed, no description can give an adequate idea of the beauty of this plant, which grows from nine inches to two feet high, rigid and erect, branched, and the branches flattened, the leaves situated on each side and decurrent with it, and light green in colour; the imbricate fruit-bearing catkins are from two to three inches long, light brown when mature, and borne in great profusion on slender upright stems some three or four inches high. A terrestrial species, requiring about the same treatment and soil as the *Lomarias* from the same country. Native of New Zealand, but very rare in cultivation.

L. taxifolium.—This is another epiphytal stove species, but does not belong to the same class as *L. Phlegmaria*, for instead of having the fertile portion contracted, or distinct in form, the ends of the branches are swollen, with the sporangia situated at the base of the leaves. It grows from nine inches to a foot in length, the stems thickly clothed with bright green acuminate leaves about half an inch long, and requires to be suspended with the head downwards, and to be grown in peat and sphagnum. Native of Jamaica.

L. uliginosum.—A very pretty dwarf-growing plant from Australia, about six inches in height. The stem is slender, much branched; leaves small, bright dark green in colour, and very closely set. It thrives well in peat and sand, with an abundance of water, either in the stove, cool Fernery, or Wardian Case.

L. verticillatum.—This very fine species grows from ten to twenty inches long; leaves in whorls round the stem, about a quarter of an inch long, acuminate, and dark green in colour; the spore-cases are situated in the axils of the leaves, at the apex of the branches; stems several times forked. A very handsome stove plant, from the Mauritius.

LYGODICTION.

This genus is distinguished from *Lygodium* by the reticulated veins; in other respects the species are similar in habit, and thrive under the same treatment.

L. Fosteri.—A very handsome species. The fronds are dense, bipinnate, and several times dichotomously divided, indefinite in length, and bright green in colour; the sporangiferous spikelets are thickly clustered round the margin of the pinnæ, giving a beautiful effect to the whole plant. A very desirable and distinct Fern, from the Polynesian Islands.

L. heterodoxum.—This species is much larger in all its parts than the preceding. I have not seen it climbing, neither have I seen it in fruit; the pinnæ are broad, palmately lobed, and dark green in colour; stipes straw colour. A distinct plant. Native of Guatemala.

LYGODIUM.

This is an elegant genus of Ferns, all scandent or subscandent in habit, and having the singular property of

extending their fronds to an indefinite length; on this account they are especially valuable, making charming objects when trained to cover pillars or used for any similar purposes in the Fernery. I have seen them used very effectively as rafter plants, when no other suitable situation could be had. In this way they show to much better advantage than when put upon trellises. The sori are marginal, and stand out boldly round each pinnule, giving the whole plant a distinct and handsome appearance. They succeed best in a mixture composed of equal parts peat, loam, and sand.

L. flexuosum.—This is one of the large-growing species; pinnæ opposite, twice divided, and from six to twelve inches or more long, of a beautiful bright green colour; sporangiferous spikelets arranged in two rows round the margins. An evergreen stove species, which should be in every collection. Native of the East Indies.

L. japonicum.—A handsome species, with scandent fronds extending to an indefinite length, branched; pinnæ palmately lobed, the fruiting spikelets situated on the apex of each lobe, giving it a beautiful appearance. This is a charming little climber, which should be universally cultivated. A cool house Fern, from China and Japan.

L. palmatum.—This very distinct species has the advantage of being nearly hardy. The fronds are palmate, usually five, but sometimes three, lobed; not so long as either of the previous species, seldom exceeding twenty-four inches, the upper portion generally contracted and fertile, bright green in colour. An interesting plant, from North America.

MARATTIA.

A genus of strong-growing, distinct, and highly ornamental Pseudo-Ferns, which do not form stems, but make

very large fleshy crowns, similar to those of *Angiopteris*; the fleshy appendages which surround the base of the stipes often assume the character of small or abnormal fronds. The soil best suited for these is equal parts of leam, peat, and river sand: if grown in a stove Fernery they should be placed partially in the water—being swamp-loving plants, they will grow more luxuriantly.

M. alata.—This, I believe, is the handsomest of the genus. It is a beautiful ornamental plant, equally as much at home in the cool Fernery or conservatory as the stove, and also makes a fine exhibition Fern. The fronds are from one to three feet in length, bi or tripinnate, the rachis winged throughout its entire length; pinnules sometimes entire, and at others dentate on the margins. A most desirable and highly decorative plant. Native of the West Indies.

M. Cooperi.—A fine distinct species, very rare in cultivation. The fronds rise from between two very rough, horny-looking, stipulæform appendages; the pinnæ are large, deeply dentate on the margins, and light green in colour. Native of New Caledonia.

M. elegans.—This is a fine decorative plant, adapted alike for the cool or warm house. The fronds are from two to six feet in height, bi-tripinnate; pinnules broad, and dark green in colour. It makes a very ornamental plant, and forms a large fleshy crown or base. Native of Norfolk Island and New Zealand.

M. laxa.—A fine ornamental species, and very distinct. The fronds are from three to six or more feet high; pinnæ nearly two feet long; pinnules about seven inches in length, and one in breadth, serrate at the edges, and rich dark green in colour. Native of Mexico.

M. purpurascens.—This is a dwarf-growing stove plant.

The fronds rise from between two leafy and fleshy stipulæform appendages to the height of one or two feet, and are bipinnate, or sometimes tripinnate; pinnules broad and undulate on the margins, very dark heavy green in colour. Native of the Island of Ascension.

MENISCIUM.

This small genus of Ferns is very distinct and well marked. The species are swamp-loving plants, and such as *palustre* and *dentatum* have a fine effect when planted near the margin of water in a tropical Fern house. A mixture containing more loam than is generally used for Ferns suits these best, though *simplex* and other small-growing kinds like more peat. They should always be kept moist at the roots, but not so as to allow stagnant moisture to remain about the soil, for that often causes the roots to decay.

M. dentatum.—A tall-growing Fern. The fronds vary from three to five feet in height, pinnate; pinnæ seven inches long, and one in breadth, and light green in colour. A rather coarse-looking species, but a fine object when grown as a sub-aquatic. Native of Brazil.

M. giganteum.—This is a very rare Fern in cultivation, and I cannot say to what size it will grow, but the fronds are very large, and quite simple. A fine warm house Fern, from tropical America.

M. palustre.—This is rather a coarse-growing plant, but very handsome when grown in the vicinity of water. It makes fronds from two to four feet or more in height, pinnate; pinnæ seven inches long and nearly two in breadth, dark green in colour, the under side being crowded with bright chestnut coloured sori. Native of Brazil.

M. simplex.—A charming little Fern for a Wardian

Case. The fronds are simple, about eight inches long, nearly two in breadth, and auriculate at the base; the fruiting fronds are the same shape, but only half an inch in breadth, and crowded with sori. A most desirable evergreen species, from Hong Kong.

MICROLEPIA.

A genus of highly ornamental Ferns, which well deserve general cultivation. They have been divided from *Davallia*, on account of the half cup-shaped fructifications, and intramarginal sori. The soil should be good fibrous peat and sand. They are of easy culture and rapid growth, soon making fine specimens, so that they are capital plants for the Fernery, and some of them do well for Baskets.

M. platyphylla.—A fine strong-growing handsome Fern, attaining the height of three or more feet. The fronds are bi-tripinnatifid; pinnules broad, from six to twelve inches in length, and divided nearly to the rachis; colour a cheerful green; sori large and conspicuous, reddish brown. This is a most desirable Fern, and is so distinct that it should find a place in every collection. An evergreen cool house species. Native of the East Indies.

M. scabra.—A beautiful and distinct species: the fronds vary from ten to twenty inches in length, and are a rich dark green in colour; they are pinnate, with the pinnæ dentate, and somewhat auriculate on the upper margin. This is a very distinct and handsome Fern for a Wardian Case. Native of Japan.

M. strigosa.—This is a magnificent species, which no cool Fernery should lack. The fronds are bipinnate, from one to three feet high; pinnæ from three to six inches in length; pinnules dimidiate, and beautifully crenate;

colour bright light green. A handsome greenhouse Fern. Native of Japan.

MICROSORUM.

A small genus, of which only one species is in cultivation. It is a simple-fronded plant, and is remarkable on account of the very small sori, which are so profusely scattered over the lower surface. The light green entire fronds contrast favourably with other Ferns: it succeeds well either in the tropical or temperate Fernery, being a plant widely distributed naturally. I believe it has been found in various parts of the East Indies, the Malay Islands, the West Indies, and Australia.

M. irioides.—An erect, simple, entire-fronded species, growing from one to two feet high, and about two inches in breadth; colour light green; sori very small, profusely scattered over the under side; succeeds well in the cool house. Native of the East Indies, &c.

M. irioides var. *cristata*.—This is a very desirable form of the preceding. The fronds are about two feet high, and three inches in breadth; the apex is profusely crested or tasselled, making it a handsome and distinct plant; the sori are very small, like the normal form. Native of the East Indies.

MOHRIA.

This is a small genus of elegant Ferns. I am not acquainted with any besides those given here. They are very desirable plants for the cool house, thriving well in the situation recommended for the Mexican species of *Cheilanthes*. For a Glass Case, also, they make charming objects, if planted so that other species do not smother

them. A compost of peat and sand, with the addition of small lumps of sandstone, suits them best.

M. thurifraga.—This is a charming evergreen cool house Fern, growing and thriving well with the same treatment as *Nothochlæna Eckloniana*, and its congeners. The fronds are from six to twenty inches long, very erect in habit, bipinnate; pinnæ laciniated; in the fertile frond they are somewhat contracted; the stipes and rachis are clothed with reddish scales. This Fern should be in every collection. Native of South Africa.

M. thurifraga var. *achilleæfolia*.—An extremely scarce Fern, but a very handsome one; it is not so robust in habit as the preceding, the fronds scarcely ever exceeding twelve inches in length, and more often not more than nine; the sterile fronds are prostrate, and much shorter than the fertile, which are erect; in other respects it resembles *M. thurifraga*, and succeeds well under the same treatment. Native of South Africa.

NEPHRODIUM.

There are several fine ornamental plants of this genus, which is chiefly distinguished from *Lastrea* by the joining together of the veins. They are of easy culture, requiring a mixture of peat, loam, and sand, and are well adapted for planting out, as they then form objects of great beauty. There are many beautiful forms of *N. molle*, which have been raised from spores, and make a very useful variety for growing in pots and planting in the cool Fernery, or the Wardian Case.

N. articulatum.—This is a fine stove species, producing fronds, from one to upwards of four feet, from a decumbent stem; they are pinnate, smooth, and bright dark green in colour. Native of Ceylon.

N. cyatheoides.—A beautiful species, and one that is very rare in cultivation. The fronds are from one to two or more feet long, pinnate; the pinnæ very long and broad, light green in colour, and deeply and regularly toothed on the margins. Found in the Sandwich Islands.

N. Hookerii.—This is a nice Fern, well worthy of general cultivation. The fronds are pinnate, from eighteen to thirty inches in length, and pale green in colour: the lower pair of pinnæ are very small, the size increasing as they ascend, and their margins are obtusely crenate. It will succeed in either house. Native of the East Indies.

N. molle corymbiferum.—A charming tasselled variety of the old *N. molle*, which has become a perfect weed in hot-houses. The present is a most interesting and desirable plant, erect in habit, producing branched fronds from one to two feet long; the top of each frond or branch has a large crest or corymb, and the end of every pinnæ is also furnished with a similar appendage, but of smaller size. An evergreen stove plant, from tropical Western Africa.

N. pteroides.—This is a distinct and handsome Fern. The fronds are pinnate, obtusely lobed, and from twelve to thirty inches long, of a rich green colour; sori confluent, forming a submarginal band. A stove species, from the East Indies.

N. truncatum.—This is a rare but very fine species. The fronds are from twelve to thirty inches long, pinnate; pinnæ regularly and obtusely lobed; colour rich dark green. An evergreen cool house Fern, from the Sandwich Islands.

N. unitum.—A fine tall-growing plant, producing fronds from one to three feet high, pinnate; pinnæ obtusely crenate, and slightly hairy, colour a vivid green.

It will succeed in either Fernery. Native of tropical America.

N. venustum.—This handsome species is deserving general cultivation. The fronds rise from twelve to thirty inches in height, and are a fine dark green in colour, pinnate; the pinnæ six inches long and very regularly dentate on the margin; base of stipes slightly scaly. An evergreen stove species, from Jamaica.

NEPHROLEPIS.

This is a handsome and very distinct family of Ferns, possessing several good distinguishing characters, and rapidly making large masses. In this genus the pinnæ are articulated to the rachis—that is, they are not fastened to the mid-rib of the frond, but are set into a little joint; this perhaps may seem of small consequence, but it is, nevertheless, a good distinguishing character, and if the plants are neglected in watering they soon prove that it is of further consequence, for should they, through accident or carelessness, be allowed to remain dry at the roots for a day or two, they will not droop their fronds, as is the case with most Ferns, but every pinna will fall off at the joints, leaving nothing behind but the bare stick-like mid-ribs. In this, however, they are not singular, *Didymochlaena*, some of the *Goniophlebiums*, and several others doing the same thing. The peculiar long wiry rapid-growing rhizome is another peculiar feature of this genus, by means of which it is readily increased. Two of the species form bulbs by which they may also be propagated, viz., *tuberosa* and *undulata*—the latter is a very handsome plant, but very rare; it is a deciduous species, and from a want of knowledge respecting it, Fern growers generally throw it away, imagining it

to be dead, and thus it has almost become lost to the country ; others, again, I have known who, being quite aware of its habit, persist in drying it off like an *Amaryllis* or *Gladiolus* bulb, the consequence of which treatment is that the tubers have ceased to exist long before the time comes when they should have been seen starting into growth again. These plants form very ornamental masses when planted in the Fernery, in any position you choose to place them, and care will need to be taken with some kinds, or they will overrun the more delicate plants. Many of them look beautiful when grown in Baskets, but on account of the jointed pinnæ they do not answer well for cutting. A mixture of peat, loam, and sand suits them well, with an abundant supply of water.

N. davallioides.—A splendid Fern, the most handsome species of the genus, and one that should be in every collection, the graceful habit of its growth, and the handsome appearance of its fertile fronds, all conspire to render it a species of no ordinary merit. The fronds are pinnate, from one to five feet in length, the upper portion only becoming fertile ; the lower pinnæ are lanceolate acuminate in form, and serrated at the edges ; the upper ones, when fertile, are much contracted and elongated, with rounded lobes, having a single sorus on the apex of each ; the barren pinnæ are from three to five inches long, the fertile ones double that length, and very narrow ; the rhizome small, creeping, and wiry. An evergreen stove species. Native of the Malay Islands.

N. ensifolia.—This is a fine robust-habited plant, producing fronds from one to three feet long, pinnate, the pinnæ lanceolate in shape, and bright green in colour ;

a useful species for rock-work in a warm Fernery. Native of tropical America and Java.

N. exaltata.—This, though a common species, is well worthy a place in a large collection, growing, as it will, under others in the Fernery, in places which would otherwise remain bare. The fronds are from one to four feet long, pinnate, linear-lanceolate, from one to three inches broad, and light green in colour. An overgreen stove Fern, and a capital one for planting on rocks near water. From tropical America.

N. hirsutula.—A pretty and distinct species, by no means common in cultivation. The fronds are from fifteen to thirty inches in length, lanceolate and pinnate; pinnæ from two to three, or more, inches long, dark green in colour. A desirable evergreen Fern, from the East Indies.

N. tuberosa.—This is a handsome Fern, and has the peculiarity of making tubers on the roots. The fronds are from twelve to twenty-four inches long, narrow pinnate, the pinnæ slightly serrated at the margins, and dark green in colour. It makes a good Basket Fern. Native of the East Indies.

N. undulata.—A very distinct and handsome dwarf-growing species, rather rare in cultivation. The fronds are from ten to twenty inches long, linear-lanceolate in shape, pinnate, and pale green in colour. It is a charming plant when fertile, and makes tubers on its roots like *N. tuberosa*. A deciduous stove Fern, from West Africa.

NIPHOBOLUS.

A genus of Ferns producing simple entire fronds, remarkable from having a dense covering of stellate scales. The plants produce two kinds of fronds, the fer-



NIPHOBOLUS LINGUA CORYMBIFERUM. *Moore.*

Japan.

tile ones being usually contracted, thus causing the sori to cover the whole of the upper portion of the under surface, and, as the sori are mostly dark red in colour, it renders these plants very conspicuous. They are useful for the Wardian Case, the small-growing kinds doing well upon blocks of sandstone; if grown in pots they should be planted upon small pyramids of peat, in which way they make handsome masses, the rhizomes creeping all over, and binding the lumps of soil together.

N. bicolor.—A very pretty greenhouse species, very closely allied to *N. rupestris*. The fronds are only a few inches high, dark green on the upper side; on the under surface they are densely covered with a white stellate pubescence; it is not in general cultivation, but a very distinct kind. Native of New Zealand.

N. Lingua.—A good cool house Fern, of easy culture. The fronds are from six inches to a foot in length, simple, and dark green in colour on the upper surface, with a quantity of white stellate scales scattered over them; the under side is drab-coloured or brown, from the scales of that colour which cover it; the fertile fronds are contracted, about the same height as the sterile, the sori, which are bright reddish brown, covering the whole under surface. An evergreen species, from Japan, China, and the East Indies.

N. Lingua corymbiferum.—This resembles the preceding, saving the length of frond, and whilst in the species the frond is simple, this has the apex sometimes branched or lobed, and furnished with a very large crest on the point of each. A new and very rare form, worthy a place in every collection.

N. pertusus.—This species is well worthy of more general cultivation. The fertile fronds are of a shining

dark green colour, thick and fleshy in substance, simple, and linear-lanceolate in form, while the barren ones are somewhat oblong and obtuse, from four to ten inches high; the upper portion of the under side of the fronds only is covered with dark red sori. This species is admirably adapted for growing in a Fern Case. An evergreen stove species, from the East Indies.

N. rupestris.—A very pretty little cool house Fern, which thrives well and produces a fine effect in a Wardian Case, either on a block of wood or sandstone. The fronds are simple, but dissimilar, the sterile ones being spatulate, and about two inches long; the fertile ones are three inches in length, linear and obtuse, fleshy, and dark green in colour; the creeping rhizome is clothed with chaffy scales. Native of Australia.

NOTHOCHLENA.

The remarks made respecting the situation and treatment of many of the species *Cheilanthes* will also apply to those of this genus, which includes, in my estimation, some of the handsomest of the known Ferns. They are very nearly allied to *Cheilanthes*, and are for the most part plants of similar habits. We have some amongst them from the West Indies, which make lovely plants when suspended in Baskets, and these, of course, require the heat of the tropical house; but most of them can be grown and enjoyed in the cool one. For those who may only have Wardian Cases in which to grow their pet plants, I could not recommend the *Nothochlenas*, for most of them are densely clothed with long woolly hairs or scales, which would render the attempt to cultivate them in such structures only a perpetual source of annoyance and disappointment. They are best grown

slightly elevated above the rim of the pot, thoroughly drained, and in a mixture of fibrous peat, silver sand, and small lumps of sandstone. The fronds should not be wetted.

N. canariensis.—A magnificent cool house evergreen species. It varies in height from six to twenty inches, and is ovate-lanceolate in shape, and bipinnate; pinnules obtuse; colour on the upper side dull green, the whole of the under side densely clothed with long reddish brown scales; stipes and rachis also similarly covered. This beautiful Fern is well deserving a place in every collection. Native of Tencriffe and Cape de Verd Islands.

N. Eckloniana.—One of the handsomest of the whole genus, and, at the same time, one of the rarest, but no collection should be without it. The fronds, when young, and the barren ones also, are wholly covered on the under side with long white silky scales, but when they become aged, or the fronds are fertile, the scales are brown; they are produced from a creeping rhizome, and are from six to twelve inches in height, somewhat ovate in shape, and tripinnate. This Fern is generally treated as a stove plant, but it succeeds best in a temperate house. Native of South Africa.

N. flavens.—This very elegant little Fern is perhaps better known as *N. chrysophylla*. The fronds are tripinnate, four to ten inches high, slender, with the pinnæ distant and spreading, and the colour a bright green on the upper surface, the under densely covered with a bright golden farinose powder, which contrasts well with the jet black marginal sori. An evergreen stove species, from tropical America.

N. laevis.—A very handsome species, growing to a foot

or more in height. The fronds are pinnate; pinnae entire; the whole of the under side of the frond is thickly covered with long brown scales, white on the young fronds. This is a rare species in cultivation, and somewhat difficult to manage, but amply repays any extra care bestowed upon it. A cool house evergreen Fern, from Mexico.

N. lanuginosa.—This very handsome Fern is a greenhouse evergreen. The fronds are about six or eight inches high, bipinnate, and covered on the under side with very long woolly scales, which spread themselves some distance beyond the margin of the frond; dark green on the upper surface. Native of the South of Europe and Madeira.

N. Marantæ.—An exceedingly pretty species, rare in cultivation. The fronds are broadly lanceolate, and bipinnate, from four to ten inches high, thickly covered below with reddish brown scales. It is similar in appearance to *N. canariense*, but is not so large, the pinnae not so obtuse, and fronds not so thick as in that species. A greenhouse Fern. Native of South Europe and North Asia.

N. nivea.—This handsome and delicate species resembles *N. flavens* in most particulars, except in having the farinose powder of a pure white. An evergreen stove species, from tropical America.

N. rufa.—An elegant species, making a pretty object suspended in a small Basket. The fronds are from ten to twenty inches long, pinnate, the pinnae pinnatifid, in colour light green above, clothed below with white woolly scales. An evergreen stove species, from Mexico and Peru.

N. sinuata.—This is a handsome Fern, and makes a

fine exhibition plant. The fronds are from ten to twenty-four inches long, pinnate, the pinnæ broad and deeply lobed at the margin, dark green on the upper surface, the under covered with white woolly scales. A stove species, from Mexico.

N. trichomanoides.—A most beautiful Fern for a Basket, or, indeed, handsome in any place. The fronds are, when well grown, from twelve to eighteen inches long, pinnate; pinnæ toothed at the edges, dark green on the upper side, and on the under densely covered with brown or white stellate scales, in addition to which it is dusted with a white farinose powder, and belted round the margin with a band of black sori, giving the whole frond a lovely appearance. An evergreen stove species, from Jamaica.

OCHROPTERIS.

This genus is nearly allied to *Pteris*. The rhizome is decumbent, and the fronds of the only species are decompound, with a somewhat pendulous habit, giving them a very graceful and highly ornamental appearance. Good peat and sand, with a little loam, is the best soil to use, and an abundance of heat and moisture must be supplied to develop its beauties.

O. pallens.—The fronds of this beautiful Fern are upwards of two feet in height, very graceful, and pendent in habit, deltoid and decompound; pinnules mostly cuneiform, usually with one sorus only on each lobe; colour of fronds pale shining green; the stipes have a few brown chaffy scales at the base, and are, together with the rachis, straw coloured. A handsome evergreen Fern, and very desirable as an ornament to the tropical Fernery. Native of the Mauritius.

OLEANDRA.

A family of epiphytal climbing Ferns, *O. neriiformis* being, however, an exception; the others make fine specimens if trained upon stout stems of dead Tree Ferns, or make fine plants to alternate with *Lygodiums* on the pillars of a Fernery, but, if they are used for this purpose, a different mode must be taken. The *Lygodiums* are terrestrial plants, and become climbers by the indefinite extension of their fronds. Such is not the case with *Oleandras*—they ascend trees, or any genial surface, by the extension of the rhizome, and fastening on with their roots; consequently, these roots must be provided with nourishment as the rhizome extends, and if used for pillar plants a wire cylinder should be made round the pillar, and filled up as the plants require it with fibrous peat and sphagnum moss. In this way, charming specimens will be made, and be a fine feature in the house, hiding, as they will, all the upright supports, which, when naked, have a bad effect. If the house is a span-roofed one, without pillars, specimens can be made just in the same way, by placing them on wire cylinders, or a piece of wall may be covered with them if such exists, or in any similar places, if the roots are provided with nourishment.

O. articulata.—A fine climbing species, producing simple, entire, linear-lanceolate fronds, a foot or more long, of a beautiful light green; it makes a fine object covering the old stem of a Tree Fern, or in any similar situation. An evergreen stove plant, from the East Indies and Mauritius.

O. neriiformis.—This is a magnificent species, and makes an excellent specimen for exhibition. The fronds are from

ten to twelve inches long, and verticillate, standing out like large fans, presenting a character entirely different to any other Fern in cultivation; it should be in every good collection. A stove evergreen. Native of the East Indies and tropical America.

O. nodosa.—A beautiful species, with simple, entire, lanceolate fronds, from ten to fifteen inches in height, and shining bright green in colour; stipes and rachis black. A very ornamental free-growing stove Fern. Native of the West Indies and Guiana.

OLFERSIA.

The species here described, if not the only one belonging to this genus, is at any rate the only one in cultivation; it is a very handsome and interesting plant, and should find a place in every collection. It belongs to the *Acrosticheæ*, and has the fruiting fronds wholly covered on the under side with sporangia.

O. cervina.—A handsome stove Fern. The fertile and sterile fronds are very distinct; the former is from twelve to twenty inches long, bipinnate, contracted, and wholly sporangiferous; barren fronds about the same height, pinnate; pinnæ broad and light green in colour. An evergreen ornamental species, from tropical America.

ONOCLEA.

This hardy exotic is a very old inhabitant of our gardens, but loses none of its beauty or interest on that account; it seems to have been introduced about the year 1699. It was named by the immortal Linnæus, and is one of the few allowed to retain both his names to the present day. There is another form, either a

species, or more probably a variety only; but as I am not acquainted with it, I have omitted it here.

O. sensibilis.—A very distinct and handsome Fern, well suited for ornamenting the hardy Fernery. It produces two distinct kinds of fronds: the fertile are bipinnate, much contracted, and forming spikes of berry-like segments, which contain the sporangia; the sterile are sub-bipinnatifid, with obtuse segments, and entire margins; length of fronds from ten to twenty-four inches, and light cheerful green in colour; should be grown in stiff soil. It is a deciduous species, from North America.

ONYCHIUM.

This is a small but very elegant genus. Only two species have up to the present time been introduced to our gardens, and of these, one has proved itself hardy, while the other is a stove species, though probably, if properly managed, it might be found to thrive well in the temperate house. Both kinds are very useful for cutting for bouquets or dinner-table decoration; they should be grown in a mixture of peat, loam, and sand, and may be increased readily, either by dividing the old plants in spring, or by raising young ones from spores, which germinate freely.

O. auratum.—This is a beautiful golden Fern. The fronds rise from a creeping rhizome, from one to two feet in height, and are many times divided; the sterile segments are cuneiform in shape; the fertile ones linear, and bright green in colour on the upper side; the indusium is a golden yellow, giving the whole of the under side a lovely appearance. An evergreen stove species. Native of the Malay Islands, &c.

O. japonicum.—A very handsome Fern, very similar in

appearance to the preceding. It makes a grand specimen, if allowed sufficient pot room, or when planted in the open Fernery; the fronds are a very dark rich green in colour, but lack the golden appearance of *auratum*. A fine hardy species, from Japan.

OPHIOGLOSSUM.

This genus, although generally looked upon as Ferns, is only a Fern ally, differing in its habit of growth, which is straight, and not rolled up as in the true Ferns. Our common Adder's Tongue is a familiar plant to most people, but some of the tropical species of this family are very extraordinary plants, and it is greatly to be regretted that so little has been done in importing them, for such plants as *O. palmatum*, and many of the *Botrychiums*, would be charming objects when once properly established. The species given below requires to be suspended in a Basket or pot, and planted in spongy peat and sphagnum moss.

O. pendulum.—A very singular plant, widely scattered, and varying much in the length of its fronds. In Madagascar it is found hanging down the forest trees, on which it grows like green ribbons, upwards of twelve feet in length, and two in breadth; and in Ceylon upwards of six feet. In Australia it is found also, but shorter. The fronds are bright green in colour; the fertile segments stipitate, spike-like, and simple, from three to six inches in length, hanging from the midrib of the fronds about a foot from the apex; it is frequently found growing with *Platycerium grande*, having its roots deeply imbedded in the same spongy mass of moss and roots. An exceedingly rare species in cultiva-

tion. It is found throughout the tropics of the Eastern Hemisphere.

OSMUNDA.

A fine genus of Flowering Ferns, which are very ornamental in the hardy Fernery. Being fond of swampy places when growing naturally, they should be supplied with water abundantly, in order to produce fine fronds. The soil best adapted is turfy loam and peat, with some river sand, which makes them root more freely, and good drainage is essential. These may be planted in moist places in the cool Fernery, but will succeed planted out with the British species near the margin of streams, where they get plenty of water at the roots, and will also make pretty objects grown in pots for exhibition.

O. cinnamomea.—This is a very handsome Fern, differing from most of this family in having a distinct wholly contracted fertile frond, which rises straight up in a mass; the sterile fronds are slightly pendulous, and form a beautiful belt round them. The fertile fronds are from twelve to twenty-four inches in length, bipinnate, wholly sporangiferous, and densely covered with reddish brown hairs; while the sterile ones are bipinnate and of a glaucous green colour. A deciduous hardy plant. Native of North America, Mexico, East Indies, &c., &c.

O. cinnamomea angustata.—A distinct and very handsome variety of the preceding, which does not grow so strong, and, indeed, is smaller in all its parts, and much darker in the colour [of its fronds. Found plentifully throughout Canada, and is perfectly hardy.

O. Claytoniana.—This most beautiful species should be in every collection of hardy Ferns. It is known by many as *O. interrupta*, from its peculiar mode of fruiting; the

fronds are bipinnate, from twelve to thirty-six inches in length, and in colour brilliant green; stipes hirsute; the fronds, when fertile, are erect, and the middle portion is contracted and wholly sporangiferous, having barren portions above and below. A deciduous plant, and one of the noblest of the hardy exotic kinds. Found in the United States and Canada.

O. gracilis.—A slender-growing species, seldom reaching a greater height than two or three feet. The fronds are bipinnate, the pinnæ being nearly opposite, and somewhat oblong; the apex of the frond only is contracted and fertile. Found plentifully in Canada.

O. spectabilis.—This is considered by many as a variety of *O. regalis*, but if so, it retains its peculiar form in cultivation, and therefore well deserves a place in the hardy Fernery. In general appearance the plant is like a delicate *regalis*, but the fronds are more slender, and the pinnæ much smaller, and in the young state they are beautifully tinged with violet or purple. Native of North America.

PARAGRAMMA.

The only species with which I am acquainted in this genus makes a good plant for suspending in Baskets, and should be grown in fibrous peat and sphagnum moss.

P. longifolia.—This rare and interesting species is a native of Moulmein, Luzon, Java, and Malacca. It has a short slender creeping rhizome; the fronds are simple, linear-lanceolate, and obtuse, from six to twenty inches long, smooth, coriaceous, and bright green in colour; the sori are near to, and parallel with, the margin, oblong-linear, deeply immersed in the fronds, forming umbones on its upper surface. An evergreen stove species only

to be met with in the best collections, as it does not germinate freely from spores.

PHLEBODIUM.

A genus of robust distinct-looking plants, giving a fine character to the Fernery with their noble fronds, which in most of the species are beautifully glaucous. This is one of the divisions of the old genus *Polypodium*, from which the species are abundantly distinct, having reticulated veins, and the sori in numerous rows upon the pinnæ. These plants require a mixture of loam, peat, and sand, with a liberal supply of water during the growing season.

P. aureum.—This, though rather a strong-growing kind, makes a noble object when planted out in a Fernery. The fronds are produced from a creeping rhizome, densely scaly, and are from two to six feet high, pinnatifid, and glaucous; colour bluish green when grown in the stove. Native of tropical America.

P. pulvinatum.—A very distinct and desirable species. The fronds are from one to three feet in length, and deeply pinnatifid, the under surface rendered very beautiful by the bright yellow sori. An evergreen stove Fern, from Brazil.

P. sporadocarpum.—This is certainly the handsomest of the three species given here; the fronds are very glaucous, from two to three feet high, and deeply pinnatifid. A very desirable species, deserving more general cultivation, and succeeding well in a temperate house, though growing more vigorously in a stove. Native of Mexico.

PLATYCERIUM.

A remarkable genus of Ferns, which naturally grow upon trees, to imitate which they are mostly grown upon

blocks of wood. When this is done, the blocks must be of a good circumference, or the beauty of the plant is lost, as its shield, or sterile fronds, clasp whatever it is growing upon, and if the block is small it makes a bad appearance. To illustrate how they should be grown, I must refer the reader to the figure given of *P. grande*. They require to be elevated to show their beauty, and make grand objects used as bracket plants, where a suitable situation can be had. *P. alcicorne* is a greenhouse species, and makes a very good Basket plant. They should be grown in sphagnum moss and good peat, and be liberally supplied with water all the year round. When large, they make fine distinct plants for exhibition. I have one specimen of *grande* which has been exhibited for ten years, and is on the same block still. If the block gets decayed, it is necessary to give a fresh one at once, or there will be danger of the plant going wrong; it must be taken off the old block carefully, and placed on a new one.

P. alcicorne.—Popularly known as the Elk's-horn Fern, and the first of the genus in cultivation. An evergreen species, thriving either in the greenhouse or stove; it is of easy culture, and should be grown on a block of wood or in a Basket; sterile fronds sessile, somewhat reniform, and permanent; fertile fronds stipitate, several times dichotomously forked, coriaceous, one to two feet in length, and densely clothed with stellate scales; sori in masses on the under side of the extremities of the frond. I have seen imported *Zamia* stems from Australia covered with this and various other Ferns, having a splendid wild and picturesque appearance. Native of East Indies and Australia.

P. biforme.—This, at present, is a very rare Fern in

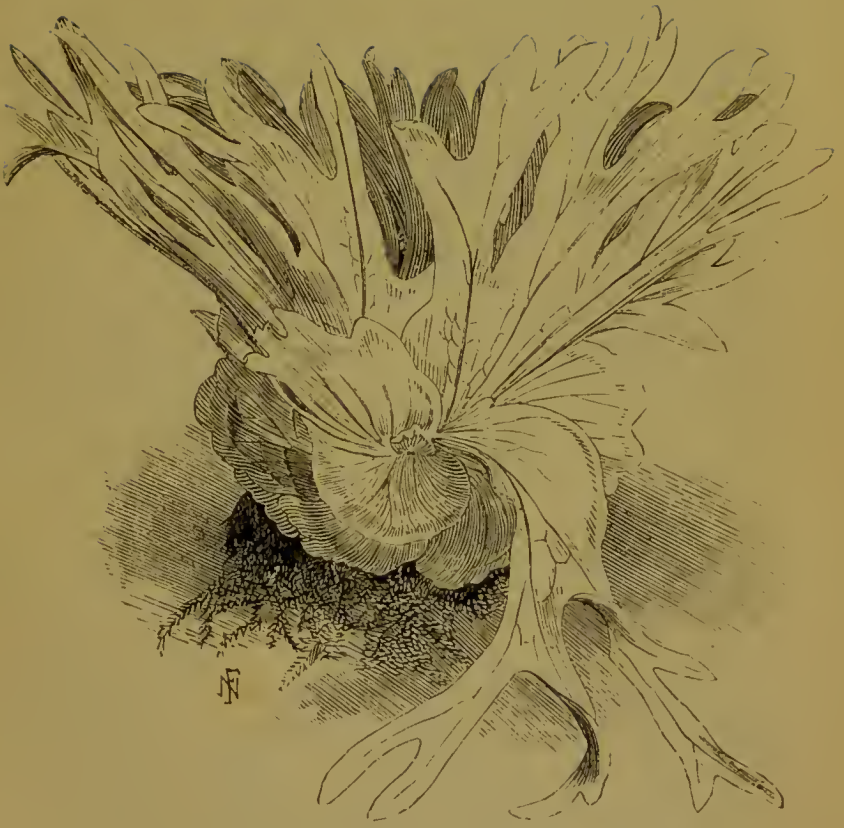
cultivation. The fertile fronds are very long, and somewhat resemble, in a young state, those of *P. Stemmaria*; as it becomes larger with us it will, however, assume its own thoroughly distinctive character, and prove the finest of its class. Native of Java, Moulmein, &c.

P. grande.—A noble species, which, when grown upon a large block of wood, makes a remarkable and handsome specimen; sterile fronds one to two feet in diameter, nearly round at the lower part, more or less forked upon the upper edges, and alternately overlapping each other; fertile fronds eighteen inches to three feet in length, coriaceous, rising from the sinus of the sterile, many times dichotomously forked; the woolly fronds glaucous in appearance, from the dense covering of stellate scales. Native of the Malay Islands and Australia.

P. Stemmaria.—This is another very fine species, an evergreen stove plant; sterile fronds sessile, elongated and subascending, one to two feet in diameter; fertile fronds twice or thrice divided, very thick and coriaceous; sori situated on the under side of each lobe at its apex. This species is more easily propagated than the preceding, as it often makes young plants upon its roots. Native of West Africa.

PLATYLOMA.

This genus contains many handsome and ornamental species. Some of those given below succeed well in the temperate house, others are elegant additions to a Fern Case, and some require the heat of the tropical Fernery to properly develop their beauties. It is a genus which seems unusually subject to the attack of thrips; and, consequently, care must be taken that these pests do not find shelter and derive nourishment from



PLATYCERIUM GRANDE. *J. Sm.*

East Indies and Australia.

their delicate fronds. Some are fine subjects for suspending in Baskets, and several are useful for dinner-table decoration, or for arranging with cut flowers in vases for the embellishment of the sitting-room, because their fronds remain fresh for a long time in water. They require to be potted in a mixture of peat and sand, with the addition of a little turfy loam.

P. atropurpureum.—A very interesting and pretty little Fern, seldom seen in good health, through being grown in stove heat. It is a native of North America, and though not sufficiently hardy to live in the open air during the winter months, it succeeds best in the cool house or Fern Case. The fronds are about twelve inches long, bipinnate, the terminal pinnules much longer than the others; colour glaucous green; stipes and rachis hirsute. A very desirable plant in a collection of Ferns.

P. Brownii.—This species is of robust growth, making fronds some eighteen inches, or more, long, pinnate, with broad pinnæ somewhat cordate, of a leathery texture, and dark green in colour; the sori make a broad continuous band round the margin of the fertile fronds, thus rendering them very conspicuous. A greenhouse evergreen plant. Native of Australia.

P. cordatum.—This is a very handsome and distinct Fern. The fronds are from one to two feet long, bipinnate; pinnæ cordate, or when fertile somewhat hastate, glaucous below, pale green above; stipes and rachis straw colour. It makes a very pretty specimen either in the cool Fernery or a Wardian Case. Native of Mexico.

P. flexuosum.—This distinct and beautiful Fern should be in every collection; it makes an admirable specimen used either as a Basket plant or for a climber. The fronds are some six or more feet in length, tripinnate;

the pinnæ alternate, and, as the name implies, zigzag; the pinnules are small and ovate; sori constituting a broad marginal band; colour of fronds light green. A temperate house species, from Peru, &c.

P. rotundifolium.—A very distinct plant, and one that is almost or quite hardy with us, producing fronds from twelve to eighteen inches long, of a dark green colour, and pinnate, the pinnæ being nearly round. Native of New Zealand.

PLEOPELTIS.

This is a considerable genus of Ferns, many of them dwarf in habit, and forming beautiful little specimens in the Wardian Case; and when suspended in Baskets they also make very fine objects—the light shining through the fronds in this position, shows the pretty reticulations of the veins and the sori to great advantage. Should they be kept in a pot, the soil, which must be good fibrous peat, should be elevated above the rim of the pot, and the creeping rhizome must be pegged to the soil to keep them fast, until the roots are able to do it themselves; they require a liberal supply of water all the year round.

The *Phymatodes* group consists of highly ornamental and interesting Ferns, producing their fronds, which are mostly firm in texture or somewhat coriaceous, from creeping rhizomes. They were formerly included in *Polypodium*, but differ in their compoundly anastomosing venation. The sori are large, and add much to the beauty of these plants; being often deeply immersed in the frond, they then cause large protuberances in the upper surface, which have a peculiar and pleasing effect. Most of them make good plants for large Baskets; and if grown in

pots, should be planted on pyramids of fibrous peat, as recommended at page 13; several of them also make very nice objects in a Wardian Case or Fern Shade.

Another group, called *Pleuridium*, contains many fine species, some of which are well suited for suspending in Baskets, while others are noble and robust-growing simple-fronded plants, very effective when grouped with kinds having more finely divided fronds. Some also are very peculiar on account of the upper side of the fronds being profusely spotted with round white dots. They succeed well in a mixture of loam, peat, and sand; when grown in Baskets the loam must be dispensed with.

P. albo-punctatissima.—This is a very distinct and handsome Fern. The fronds are simple, entire, from ten to thirty inches high, and about two inches broad, thick and leathery in texture, and dark green in colour, dotted all over the upper surface with small white spots. An erect-growing species. Native of tropical America.

P. angustata.—This beautiful Fern is admirably adapted for suspending in a Basket. The fronds are pendulous, from twelve to thirty-six inches long, pinnate; pinnae seven inches long, upper ones sessile; colour vivid green; sori reddish brown, and very conspicuous. A handsome stove evergreen, from Java.

P. Billardieri.—An old inhabitant of our gardens, and one admirably adapted for a cool Fernery or Wardian Case. The fronds are simple in some cases, in others pinnatifid, from ten to fifteen inches in length, erect, and dark green in colour; sori large, immersed in the fronds, producing umbones on the upper surface. An evergreen species. Native of Tasmania, Australia, and New Zealand.

P. crassifolia.—A fine bold-growing species. The

fronds are simple, entire, from six to thirty-six inches high, and from one to three in breadth, erect, and dark green in colour; sori dark brown and very large. When planted out in the Fernery this plant makes a fine mass, contrasting well with the plants having finely divided fronds. Native of tropical America.

P. crassinervia.—This fine plant grows from twelve to twenty-four inches in height. The fronds are simple, entire, ovate-acuminate, and about four inches broad, dark green in colour, and the upper surface profusely spotted with white dots. They are produced from a stout creeping rhizome, densely clothed with stiff and long brown hairs. Native of Java.

P. incurvata.—A rare and handsome species. The sterile fronds are slightly pendulous, about fifteen inches high, broadly trilobed, and dark green in colour; the fertile are erect, two feet high, contracted, pinnatifid, with usually two pairs of pinnæ beside the ultimate one; sori large and immersed in the frond. A very distinct and ornamental Fern for the tropical house. Native of Java.

P. longipes.—This very fine species is deserving a place in every collection of stove Ferns. The fronds are pinnatifid, about two feet long, erect in habit, and vivid green in colour; the large sori are immersed in the fronds, producing the curious umbones on the upper surface so common to this family. Native of the East Indies.

P. nigrescens.—A robust-growing species, producing pendulous fronds, upwards of two feet long, pinnatifid; pinnæ about nine inches long and one and a half wide, and dark green in colour; the sori form very prominent umbones on the upper side, giving it a very handsome appearance. It is sometimes called *Phymatodes saccata*. An evergreen stove Fern from Java.

P. peltidea.—This species grows about eighteen inches high, pinnatifid, and rich dark shining green in colour; the sori are depressed, raising umbones on the upper surface; stipes reddish brown. It will thrive well in a Wardian Case. Native of the East Indies.

P. percussa.—A very handsome Fern, with thick fleshy simple fronds, somewhat lanceolate in form, slightly scaly on the under surface, and dark green in colour; the sori are very large, and dark reddish brown. An evergreen species, which should be more generally cultivated. Native of tropical America.

P. pustulata.—A very interesting Fern, suitable for the cool Fernery or a Wardian Case. The fronds are sometimes simple, and at other times pinnatifid, about twelve inches long, and light green in colour; sori round, large, and reddish brown in colour. Native of New Zealand.

P. squamulosa.—This pretty dwarf species is admirably adapted for suspending in Glass Cases. The fronds are from two to five inches long, very dark green in colour, simple and oblong in form, and leathery in texture; the sori are large and prominent, giving the whole plant a pleasing appearance. Native of Brazil.

P. stigmatica.—To see this beautiful Fern to perfection, it must be grown in a Basket, and not hung too high, so that the exquisite markings or reticulation of the veins may be seen. The fronds are simple, oblong-lanceolate in shape; the fertile fronds somewhat contracted, bearing large prominent sori; colour light green, with darker green veins. Native of tropical America.

P. venusta.—A fine pendulous kind. The fronds are from one to two feet in length, pinnate; pinnæ six or more inches long, and a dark somewhat glaucous green

in colour; sori brown, large and bold. A very handsome species for suspending in Baskets in the cool Fernery. Native of the East Indies.

POLYBOTRYA.

A genus of robust-growing Ferns, the rhizomes of which are scandent and stout, and, if encouraged, will ascend the stem of a Tree Fern, or any such object. If trained upon one of these dead trunks which is about four feet in height, they soon make splendid objects in the tropical house, their large dark green sterile fronds contrasting beautifully with the fertile, which have all the pinnules contracted, and are wholly sporangiferous. Treated in the way recommended for *Oleandra*, they will thrive well.

P. caudata.—This is a very handsome Fern. The sterile fronds are from two to three feet in length, and one and a half in breadth, bipinnate; pinnae upwards of six inches long; pinnules broad, dentate on the margins, and bright shining green in colour. The fertile fronds are of the same size, but the pinnules are contracted, about two inches long, and linear, wholly covered with the brown sori. Native of the West Indies.

P. Lowii.—This Fern is better known in gardens as *Lindsaea Lowii*, but it certainly has not the slightest affinity with that genus. The fronds, when in their first stage, have the pinnae confined to one side of the rachis, obtusely lobed and decurrent with it; next they are developed on both sides. The form it assumes in the third change is pinnate, with broad, distant, entire pinnae, beyond which it has not reached, as far as I am aware; but when it arrives at maturity, it will doubtless prove itself to be a large climbing aerostichoid Fern, very far removed from

Lindsæa. A stove Fern, found in the Malay and Polynesian Islands.

P. osmundacea.—A very fine species. The fronds are tripinnate; pinnules of the barren frond broad and obtuse; the fruiting fronds are contracted, and wholly sporangiferous. The pinnules are much shorter than in the preceding, and the stipes are clothed with long brown scales. An evergreen stove Fern, from tropical America.

POLYPODIUM.

This genus, according to old authors, is a very large one, but more recent authorities have reduced its unwieldy proportions, and, by grouping the species, have enabled us to understand them better. It will be, I think, evident that, with the genera we now have, it is far easier to obtain a good knowledge of Ferns than it was when the genus *Polypodium* included *Goniopteris*, *Goniophlebium*, *Phlebodium*, *Pleopeltis*, *Paragramma*, *Nipholobolus*, *Drynaria*, and a host of others. Then, it must have been very difficult to make up a definition of the genus; now, it is simplified, and if a Fern grower is at a loss, he can, at least, soon see whether his plant belongs to *Polypodium* or not. They are handsome species, well worthy of general cultivation, and many fine members of this family have yet to be introduced to adorn both tropical and temperate Ferneries. They are distinguished by their free veins, bearing the sori in single rows upon the end of the short vein, and some of the species have a creeping, and others an erect rhizome. All succeed well in good fibrous peat and sand, with an abundant supply of water to the roots. The fronds of most species are firm in texture, and last

a long time after they are cut. They are splendid objects for planting in the crevices of rocks.

The *Phegopteris* group of this genus are all well deserving general cultivation, and are of rapid and easy growth in most cases, thriving well in a mixture of peat and sand, with the addition of a little loam. Some of them will do for Wardian Cases, and others will do well for the Fernery under glass.

P. divergens.—A beautiful and highly ornamental species; fronds one to two feet in height, decomposed, broad, and finely divided, light green in colour, and gracefully arched. A fine species for a large Basket or a Vase. An evergreen stove Fern, from the West Indies.

P. drepanum.—This is a fine cool house Fern, growing from ten to twenty-four inches in height, bipinnate; pinnules serrated on the margins; sori large and conspicuous; stipes clothed with large dark coloured chaffy scales. Native of Madeira.

P. hastæfolium.—This is a dwarf-growing Fern, of great beauty, forming a neat and pretty specimen in a Fern Case. The fronds are from five to ten inches in height, pinnate, sometimes an inch long and linear, auriculate at the base on both margins, the colour a dark shining green. Native of Jamaica.

P. Henchmani.—A handsome evergreen stove species. The fronds are pinnate, from one to two feet long; pinnæ linear-lanceolate, glabrous, and of a glaucous green colour. It is well worthy of general cultivation, but at present rare in collections. Native of Mexico.

P. hexagonopterum.—A very pretty Fern, and, I believe, perfectly hardy. The fronds are about fifteen inches in height, and eight inches in breadth at the base, gradually tapering to a point, bipinnatifid, thin in texture, and

dark green in colour; stipes and rachis straw coloured, slightly pubescent. A deciduous species, from North America.

P. lachnopodium.—This fine species is rare in cultivation. The fronds are dark green in colour, from two to five feet in length, bi-tripinnatifid; pinnules lanceolate, and from nine to twelve inches in length; stipes densely hairy at the base, which is continued throughout the entire length of both stipes and rachis. An evergreen stove Fern. Native of Jamaica.

P. macropterum.—A fine bold-growing handsome Fern. The fronds are from one to three feet in height, pinnate; pinnae about seven inches long, and deeply pinnatifid; pinnules obtuse, and slightly falcate, colour a rich dark green. A very desirable evergreen stove Fern. Native of Brazil.

P. Paradisææ.—This beautiful species, though tall in habit, is by no means a coarse-growing plant. The fronds are upright and a little arched at the top, from one to four feet in length, and from three to eight inches, or more, broad, deeply pinnatifid, in colour dark green, and slightly pubescent; sori a bright golden yellow, giving the plant a charming appearance. An evergreen stove Fern, from Brazil.

P. pectinatum.—A charming evergreen Fern, somewhat resembling the previous species, but more rigid, and neither so tall nor so broad in its growth. The fronds are deeply pinnatifid, from ten inches to two feet in length, pubescent, and dark green in colour. A handsome species. Native of tropical America.

P. sanctum.—A beautiful little Fern, of dwarf habit, growing in the form of a crown (or rosulate). The fronds are from four to ten inches high, bipinnate; pinnules very small and densely covered with sori; the upper

side rich dark green in colour. A charming species for a Wardian Case. Native of Jamaica.

P. Schkuhrrii.—This is an elegant species, growing to the height of about twelve inches when well managed. The fronds are lanecolate, and deeply pinnatifid, of a delicate green colour, and presents a beautiful appearance. An evergreen stove Fern, from Brazil.

P. spectabile.—Fronds from one to three feet high, bipinnate; pinnæ deeply pinnatifid, deep green in colour, and hirsute. This is a fine noble-growing Fern, but is rare in cultivation. An evergreen stove species. Native of tropical America.

P. tenellum.—Under the name of *Polypodium* or *Arthropteris filipes*, is sometimes grown; a peculiar dwarf-habited Fern, which, so far as I am acquainted with it at present, is a dwarf climbing plant, producing fronds about three inches long, in which state it is a pretty object in a Wardian Case. This, however, is only the young or simple state of the species, which, as it acquires strength, changes into a pinnate-fronded plant, with long narrow pinnæ. A cool house Fern. Native of New Zealand.

P. trichodes.—A very ornamental Fern, with bi-tripinnate fronds, from one to four or more feet in length, and finely divided segments, of a bright green colour, covered with minute white hairs; stipes scaly at the base and hirsute. An evergreen cool house Fern, graceful and elegant in appearance, and easily grown into a good specimen. Native of the East Indies.

P. unidentatum.—This handsome Fern is very rare in cultivation. The fronds are from one to two feet high, decompound, and rich green in colour. It is a native of the Sandwich Islands, and will, no doubt, succeed in the cool house.

P. Walkeræ.—A fine, bold, and handsome species which should be grown in every collection. The fronds are about two feet in height, pinnate; pinnæ six or seven inches long and one broad, dentate on both margins, and bright dark green in colour; sori large and conspicuous. An evergreen stove Fern. Native of Ceylon.

POLYSTICHUM.

This is a large genus, all worth growing, but it is not my intention to name them all here. I give below what I consider the best selection from those species with which I am acquainted; they are quick growing, and easy of culture, and being found widely scattered throughout the world, we are able to use some for the decoration of the hardy as well as for the temperate and stove Fernery. A mixture of peat, loam, and sand suits them well, adding a larger proportion of loam to the strong-growing kinds. The fronds are firm, and of good substance, which makes them useful for cutting for large vases for hall decoration, if kept in water to keep them from shrivelling.

P. acrostichoides.—A fine hardy species, producing fronds of a heavy green colour, from ten to thirty inches long, pinnate; pinnæ eared on the upper margins, and armed with bristly hairs; the upper portion of the frond is contracted when fertile. Native of North America.

P. amplissimum.—This is a very handsome species, producing large decomposed fronds, thirty inches long, and dark green in colour; stipes and rachis straw colour, and slightly pubescent. Native of Brazil.

P. capense.—This is a fine bold-growing plant, succeed-

ing in either the temperate or tropical house. The fronds are tripinnate, with blunt dentate segments, produced from a stout scaly creeping rhizome, and are from two to six feet high, gracefully arched, dark bright green in colour. It makes a noble specimen when planted out. Native of South Africa.

P. conitifolium.—A peculiarly beautiful Fern, not so frequently grown as it should be. An evergreen species, producing tri-quadripinnate fronds, deltoid in shape, from ten to twenty-four inches long, and bright green in colour; the rachis and stipes are densely hairy; the sori large, nearly covering the under side of the fronds. It requires stove heat. Native of Ceylon and the East Indies.

P. denticulatum.—This is one of the handsomest in the genus. The fronds are somewhat triangular in shape, six to twelve inches high, and very finely divided; the base of the frond is clothed with black scales. An evergreen species, which should find a place in every Fernery, succeeding best in the cool house. Native of Jamaica.

P. falcinellum.—A fine cool house species. The fronds are pinnate, from twelve to twenty inches long; pinnæ eared on the upper margin, and bright green in colour on the upper side, paler beneath, with bold reddish sori; base of the frond and crown of the plant densely covered with large brown chaffy scales. This species makes a handsome object when grown to a specimen plant. Native of Madeira.

P. lepidocaulon.—A very rare plant in cultivation, and one that will make a good addition to the Fern Case. The fronds are from six to fifteen inches long, pinnate, dark green, auriculate on the upper margin; the upper part of the frond is naked and proliferous at the apex;

stipes clothed with light brown chaffy scales. A very interesting greenhouse plant, from Japan.

P. mucronatum.—This is a remarkably handsome Fern. The fronds are from twelve to thirty inches long, and three in breadth, pinnate and lanceolate in shape; pinnæ auriculate on the upper margin, and dentate on both, hirsute on the under surface, and armed with a short spine on the end; stipes densely clothed with long brown hairs. This name is often erroneously applied to *P. triangulum*, which is a very different plant to *mucronatum*. A very desirable evergreen stove Fern, from Jamaica.

P. ordinatum.—A very fine temperate house species, producing fronds from one to four feet long, bipinnate; rachis densely covered with imbricate chaffy scales. It is a beautiful object in the cool Fernery, and also for a conservatory; it makes a fine exhibition plant, and when grown in small pots, makes a good plant for the dinner table. A recent introduction, from Chili.

P. proliferum.—This is a very ornamental species. The fronds often attain the height of twenty and thirty inches, bipinnate, and somewhat lanceolate in shape, bearing young plants at the apex; on the under side the pinnules are dentate on the margins, thick in texture, and dark heavy green in colour. Stipes densely clothed with large black chaffy scales. A very fine species, succeeding well in the hardy Fernery with a little protection in winter. Native of Tasmania.

P. setosum.—A fine distinct hardy species. The fronds are from nine to twenty inches, or even more, in height, bipinnate; the pinnules somewhat orbicular in shape, and mucronate. The stipes densely clothed with large reddish brown chaffy scales, and the whole under side of the fronds hairy. It is a desirable plant, forming a beautiful

specimen with its rich green arching fronds. Native of Japan.

P. triangulum.—A very distinct and handsome compact-growing Fern. The fronds are from ten to fifteen inches in height, light green in colour, and pinnate; pinnae triangular and somewhat auriculate on the upper margin; the segments spinulose; stipes scaly at the base, and hirsute the entire length of the frond. This is one of the best for a Wardian Case, being easy of culture, compact in habit, and distinct in appearance. Native of the West Indies.

P. triangulum var. *laxum*.—This is an elegant form of the preceding, about the same size and colour, but the pinnae are divided into several small segments, and each surmounted by a long white spine; the stipes are clothed with larger scales, and are more pubescent than the preceding. A beautiful variety, which makes a splendid specimen for a Wardian Case. Native of the West Indies.

P. venustum.—A most elegant erect-growing Fern, producing fronds from eight to twelve inches in height, and rich dark green in colour, bipinnate; pinnules toothed, and aculeate on the margins. The crown and the base of the fronds densely clothed with chaffy scales, nearly half an inch long, black in colour, margined with brown, which decrease in length, but increase in breadth, as they ascend the frond, which they do nearly to the apex, forming a thick imbricate band up the under side of the stipes. An evergreen greenhouse species, from New Zealand.

P. vestitum.—This very handsome species succeeds well in a cool house. The fronds are bipinnate, and lanceolate in form, from ten to eighteen inches long, and of a beautiful rich green in colour; rachis and stipes very scaly. An evergreen species, from New Zealand.



PTERIS SERRULATA ANGUSTATA. *T. M.*

Garden variety.

PTERIS.

An extensive genus, which formerly was very unwieldy, through its having so many distinct-looking plants tacked on to it. They have been removed, however, by pteridologists, and we now recognise *Onychium*, *Doryopteris*, *Litobrochia*, *Platyloma*, *Allosorus*, &c., &c., as good and distinct genera, and the elimination of these, leaves for the present genus only plants with marginal sori and free veins. Ferns, like other plants, seem to have conformed to the prevalent fashion, and now that variegated foliage has become all the rage, they also yield their quota to maintain themselves in the list of fashionable plants. The genus *Pteris* has produced the greatest number of species—indeed, the *Pterides* seem to have produced nearly all the variegated Ferns which are at present known in cultivation. Why this should be I am at a loss to say; such, however, is the case. The variegated forms in this genus are *P. aquilina variegata*, *argyræa*, *aspericaulis*, *cretica albo-lineata*, *nemorialis variegata*, *serrulata variegata*, and *tricolor*, and *Doryopteris nobilis*. Besides these plants I know of only two or three species and a few varieties which are variegated. The *Pterides* are mostly strong-growing plants, highly useful for decorative purposes, and many of them good ornamental species for the temperate Fernery; their fronds also last a long time when cut, thus making them useful in this way. Some of the species that are not so robust in their habit make neat and handsome specimens in a Wardian Case. The strong growers should be potted in a mixture of equal parts loam, peat and sand; the more delicate kinds succeed best without the loam. They must all have a liberal supply of water

during the growing season. They make good kinds for planting on rock-work, and where they are allowed to come up from seeds over the walls and rocks, they have a pleasing appearance. I have seen walls ten feet high covered with *serrulata*, which had sprung up from spores that had collected in the crevices; these walls are kept well moistened with the syringe twice a day in summer, and also well shaded from the sun, which will induce the plants to send out their graceful fronds to advantage.

P. arguta.—This, though by no means a rare species, is very handsome and effective in any place where a large plant is wanted, and plenty of space can be given. The fronds are produced from an erect caudex, and are from two to five feet high, fully one-half being naked; they are pinnate, the pinnae being pinnatifid, and the lower pair bipartite. A fine free-growing evergreen cool house Fern. Native of Madeira.

P. argyræa.—This is a very handsome species, making fronds from two to four feet in length, pinnate, the pinnae being pinnatifid, and the lower pair bipartite; colour silvery white, the margins a bright light green. A most ornamental species, growing well in the cool house, but making a finer and more conspicuous plant in the tropical Fernery. It is an evergreen Fern which should be grown by every one. Native of the East Indies.

P. aspericaulis.—A very desirable plant, which requires more heat than most of the species. The fronds vary from about twelve to eighteen inches in length, pinnate; the pinnae are deeply pinnatifid, the lower pair bipartite; the stipes are reddish and rough, rising from an erect caudex. This beautiful Fern is a native of the East Indies.

P. Bovini.—This is an exceedingly rare species in cul-

tivation. The fronds are from six to ten inches long, bipinnate; the sterile pinnæ ovate, beautifully crenate all round the margins; fertile somewhat hastate, dark green in colour above, pale beneath; stipes and rachis black, clothed with short hairs of the same hue. A beautiful evergreen stove Fern. Native of Ceylon, South Africa, and Madagascar.

P. Calomelanos.—An exceedingly handsome and interesting Fern. The fronds are from ten to fifteen inches high, broadly triangular in shape, bipinnate; pinnules deltoid, smooth, and glaucous; the stipes are polished black. This is a most desirable evergreen temperate house Fern, and merits a place in every collection. Native of South Africa.

P. crenata.—A very distinct species, and one that succeeds either in the cool or warm house. The fronds are from ten to twenty inches high, dark green in colour, bipinnate; pinnæ crenate on the margins, and somewhat ovate in form, the fertile ones linear in shape, and decurrent; sori forming a broad marginal band, which does not continue round the points of the pinnæ. Native of China, &c.

P. cretica.—A very distinct greenhouse evergreen Fern, well deserving a place in the cool Fernery, where it makes a very attractive object. The fronds are upwards of a foot long, very bright green in colour, pinnate; the lower pair of pinnæ again divided; the fertile pinnæ are much narrower than the sterile ones. Native of the Tropics, &c.

P. cretica albo-lineata.—This is a very handsome variety of the former; the habit is similar, but a broad band of white runs up the centre of every pinnæ, giving it a most beautiful appearance. An overgreen Fern, and one

that has become a general favourite. Native of Japan, but succeeds well in either a cool or warm house.

P. geraniifolia.—This is a charming little species, admirably adapted for a Fern Case. The fronds are about ten inches high, in shape like those of *Doryopteris palmata*, but divided much more, dark green in colour, the sori marginal, reddish brown; stipes black and shining. Native of the East Indies and South America.

P. hastata.—A very handsome and easily grown Fern, and one which is very useful for bouquet making, on account of its lasting a long time after being cut. As a Wardian Case plant, it is one of the very best, the polished black stipes contrasting so well with the dark green pinnules. The fronds are bipinnate, from twelve to twenty-four inches long; pinnules hastate in shape, and deep green in colour; sori dark brown, forming a continuous marginal band round the pinnae. An evergreen cool house Fern, the larger variety of which, and much the finest, is also known in gardens under the name of *P. adiantoides*. Native of South Africa.

P. heterophylla.—A very pretty compact-growing species, making fronds about eight or ten inches high, bipinnate, and of a bright dark green colour; pinnae obtusely lobed. A very desirable evergreen stove species, and one of the prettiest of small Ferns. It is useful for a Wardian Case, and ought to be grown in every collection. Native of Jamaica.

P. Kingiana.—A fine free-growing kind, requiring ample space to develop itself, and then making a very grand object in the cool house. It is an evergreen species, with fronds from two to three feet long, sub-bipinnate and broad, of a pale green colour. Native of Norfolk Island.

P. longifolia.—This is a well-known evergreen species,

requiring no care in its cultivation, thriving in a stove, and having a very pretty appearance in the cool Fernery, especially on walls and rocks. The fronds are produced from a decumbent rhizome; they are from one to two feet in length, lanceolate in form, and pinnate, the ultimate pinnae being very long. It is an erect-growing plant, widely distributed, being found all over the tropics, and is very suitable for cutting for the dinner table, as it stands well in water.

P. quadriaurita.—This beautiful, though somewhat common Fern, should be grown in every collection. It grows from one to three feet in length, and the end of each pinnae is lengthened out into a long tail, giving it a very handsome appearance; it is subject to a great deal of variation, but all its forms are handsome. An evergreen species which is rather accommodating, succeeding either in the cool or tropical house.

P. scaberula.—A very handsome dwarf species. The fronds are produced from a freely creeping rhizome, and are of a light cheerful green in colour, four times divided into very fine segments, lanceolate in outline, from ten to fifteen inches long, and about five inches wide. A greenhouse evergreen Fern, which should be in every collection, however small. This I have seen planted out in a hardy Fernery, and stand well where it was protected with old leaves. Native of New Zealand.

P. semipinnata.—This is a very distinct and fine upright-growing plant. The fronds are about two feet long, pinnate, the lower side of the pinnae becoming semi-pinnate. An evergreen stove species, widely dispersed through the East Indies.

P. serrulata.—Though this is so common and well known

a plant, I am compelled to find a place for it here; indeed, the fact of its being so generally cultivated is a proof of its usefulness; it is in constant demand for cutting to make up with bouquets, for the ornamentation of the dinner table, for Fern Cases, and to plant singly in Fern Shades, and is a very handsome and ornamental plant in the Fernery. The fronds are pinnate, pendulous; the pinnæ linear, with the lower pair again pinnate, and light green in colour. An evergreen temperate house species, from Japan and China.

P. serrulata angustata.—This beautiful Fern will become a great favourite. For a good idea of its appearance, I must refer to the accompanying woodcut. The pinnæ are very much narrower than in the species, and are crested at each point; it is an elegant form, well suited for all the purposes for which *serrulata* is so famous, with much additional beauty, and succeeds well in either Fernery or the Wardian Case.

P. serrulata cristata.—A very handsome form of this species, differing from it in having broader fronds, which are not so much lengthened out, with the apex of every pinnæ beautifully crested, and in being erect in habit; a most useful and highly ornamental Fern, making a charming specimen in a Case or Fern Shade.

P. serrulata polydactyla.—This is also a very distinct and fine form, resembling the species in habit and size, but having all the points of the pinnæ several times forked or fingered, and often much lengthened out.

P. straminea.—This fine Fern is perhaps better known by the name of *P. crispa*; it is a magnificent greenhouse species, contrasting well with most other kinds. The fronds are pinnate; pinnæ pinnatifid, beautifully undulate, and



RHIPIDOPTERIS PELTATA. Schott.

West Indies.

a most intense green in colour: it should be in every collection of these plants. Native of Chili.

P. sulcata.—A handsome strong-growing kind, producing fronds from twelve to thirty-six inches in length, pinnate; the pinnæ pinnatifid, the lower pair bipartite; colour rich bright green. An evergreen stove species, well deserving a place in the Fernery. Native of Brazil.

P. ternifolia.—This is a very distinct and singularly handsome species; when grown in a Basket, with the fronds hanging all round, I know of nothing I can compare it with for elegance and beauty. The fronds are from ten to twenty inches long, pinnate; pinnæ ternate, sessile, trilobed, and glaucous green in colour; stipes and rachis purple, the former clothed with long, thin, white, chaffy scales; rhizome creeping and scaly. An evergreen stove Fern, from tropical America.

P. tricolor.—This most beautiful variegated species in form resembles *P. aspericaulis*; the centre of each pinnæ is a bright rosy red, with a margin of white on each side, which is beautifully set off by the rich shining green of the other portion of the fronds. A superb plant, which should be in every collection. Native of the East Indies.

P. umbrosa.—A fine ornamental plant, growing from twelve to forty inches high; fronds pinnate, the lower pinnæ becoming again pinnate; colour vivid green. This is a noble Fern for planting out in the cool Fernery. Native of Australia.

RHIPIDOPTERIS.

This is the only one of this genus with which I am acquainted. It is an elegant and interesting little plant, making, as its name implies, little fan-like fronds, which grow only a few inches high. I know of only one other

plant anything like it, and that is *Actiniopteris radiata*, which has an erect caudex, and has even a more fan-shaped frond than the *Rhipidopteris*. The latter succeeds well grown in good fibrous peat and sand, a little raised above the rim of the pot, and requires a liberal supply of water all the year round; it does not require a deep pot, as it creeps on the top of the soil; a pan will be the best to grow it in.

R. peltata.—A very elegant little stove Fern, producing, from a slender creeping rhizome, sterile fronds from three to six inches high, several times dichotomously divided, and presenting the appearance of a miniature Fan Palm; the fertile fronds are sub-rotund, and, like most of the *Acrosticheæ*, the under side is entirely covered with the sori. An evergreen species, from the West Indies.

SALPICHLÆNA.

I am not aware that there is in cultivation more than one species of this genus, which is nearly allied to *Blechnum*. The indusium is like a pipe covering the sorus. The fronds of this plant, like those of *Lygodium* and some other genera, are not formed in a coiled-up bud, but continue to grow to an indefinite length. It should be potted in good fibrous peat and sand.

S. volubilis.—A fine bold-growing Fern, which makes a fine object when used as a pillar plant, for which it is admirably adapted. The fronds are bipinnate, and climb to an indefinite length, the pinnae being nearly two feet long; they are of a heavy dark green colour. An evergreen stove plant, from tropical America.

SCHIZÆA.

A most beautiful family of Ferns, but extremely rare in cultivation; let us hope we may soon become more fami-

liar with them. The tropical species are somewhat difficult to establish; and, like the Filmy Ferns, they require a close humid atmosphere. A mixture of loam, peat, leaf mould, and silver sand is best adapted to their growth, taking care to give good drainage, as the plants require an abundance of water, both at the roots and over their fronds, this being given in the shape of light sprinklings, either with a fine-rosed watering pot or syringe.

S. elegans.—This is a very singular and beautiful Fern, producing fronds of two kinds; the sterile ones are from ten to fifteen inches high, and from six to nine broad, dichotomously flabellate, and shining light green in colour; the fertile fronds are narrower, and bear upon the points of the segments clusters of pinnate crests, on which are situated two rows of sessile sporangia. An evergreen stove species, so thoroughly distinct and interesting that it should find a place in every Fernery. Native of Trinidad, &c.

S. pusilla.—A very dwarf-growing plant, one that makes a charming object for a Wardian Case, entirely different from any other. The barren fronds are about two inches in height, very narrow, simple, and linear in shape; the fertile ones are a little longer, of the same shape, having on the point a pinnate crest, bearing the sori. An interesting greenhouse Fern, from New Zealand.

SCOLOPENDRIUM.

The common Hart's Tongue Fern, and its innumerable varieties, are now as familiar to Fern growers as "household words"; but to those not acquainted with this plant, nothing in the shape of varieties that has been produced by our British *S. vulgare*, can give any idea

of the present plant, which is a fine pinnate species, growing upwards of a foot in height, with narrow pinnæ some three inches long, the whole plant resembling in general appearance some *Blechnum* that had forgotten to produce contracted fronds. It is a fine and interesting plant for the temperate house, and succeeds well in peat and sand, with good drainage; the fronds, moreover, last a considerable time in water after they are cut.

S. Krebsii.—A very interesting species, being so unlike the form generally associated in our minds with the Hart's Tongue genus. The fronds are ovate-lanceolate in shape, pinnate; the lower pinnæ are auricled at the base, and of a deep green colour, from ten to twenty inches long. An evergreen greenhouse species, from the Cape of Good Hope.

SELAGINELLA.

These plants, though bearing no relationship to Ferns, are very Fern-like in form and general appearance, equaling—nay, sometimes even surpassing them—in grace and beauty. From their relatives, the *Lycopodiums*, they are distinguished by having two kinds of spores, one large and the other very small, upon which there has been much controversy. It seems both kinds germinate, and some assert that the so-called large spores are not spores at all, but viviparous buds. In another point they also differ from *Lycopodium*, and that is by having their stems clothed with two kinds of leaves, the smaller of the two being stipulæform. They are plants of easy culture, being invaluable for purposes of decoration, and no collection of plants, however small, should be without some few species. Many of them succeed admirably in a

Wardian Case, and others succeed well in the temperate house, whilst one or two are quite hardy; some are tall growing, and others creep upon the ground, and form a splendid green carpet-like covering. In colour they are also variable; many shades of green are to be had; one changes to white as the sun sets in the evening, and resumes its coat of green again before morning; others are of the most dazzling metallic blue; and even some of them have their foliage variegated. They should be potted in good fibrous peat and sand; some of the species thrive best with a little loam, but not many—even in chopped sphagnum moss they seem to delight. Let the pots be well drained, so that an abundant supply of water may be given, and let the general treatment be the same as the Ferns, and they will grow rapidly. Broad shallow pans are the best to grow them in for exhibition, as they require room to spread, and most of them root upon the surface. These are deservedly encouraged at our shows, and many fine specimens may be seen exhibited in the country. Many also make useful objects for the Fernery, for planting in clefts of the rocks, and covering the edges of the walks.

S. africana.—A very fine strong-growing ornamental species; the stems rise from an underground stolon to the height of twelve or fourteen inches, and are about eight inches in breadth, triangular in form, and of a beautiful dark glossy green colour. It is said to be more correctly named *S. fulcrata*. A very handsome stove kind, from West Africa.

S. apus.—This is a charming little creeping plant—a beautiful species for the Wardian Case; it grows only one or two inches in height, but spreads very rapidly, forming a splendid carpet-like covering, of a light

green. It is a stove species, and a favourite with everybody. Native of Brazil.

S. atroviridis.—One of the most beautiful of the sub-erect kinds; it grows from six to twelve inches high, producing many adventitious roots along the underside of the branches; the larger leaves are broad and obtuse, the smaller closely covering the stem and branches, and dark glossy green in colour. A stove species, from the East Indies.

S. caulescens.—A very elegant species, rising erect from an underground stolon, growing nearly two feet high, somewhat deltoid in outline; fruiting points of branches contracted. Native of the East Indies.

S. ciliata.—A very delicate and handsome sub-erect species, of annual duration, and propagated by little bulbs, growing from six to ten inches high, and two to four in breadth; leaves narrow, pale green in colour; fruiting points contracted. A rare plant in our gardens. Native of tropical America.

S. conferta.—A very fine-growing species. The stems are broadly branched, and from ten to eighteen inches high; the stipulæform leaves are larger than those on the branches, obtuse and distant; sporangia on contracted terminal spikes; colour dark heavy green. An evergreen stove plant, from Borneo.

S. convoluta.—A handsome species, with dark green branches, the stems arranged in a rosulate form, and making a beautiful crown or nest. A rather difficult plant to manage; the finest I ever saw was grown under a bell-glass. Native of Brazil.

S. cuspidata.—This beautiful and delicate plant belongs to the rosulate section of this family—that is, the stems are arranged in a whorl round the crown

somewhat like the petals of a rose; it grows from six to fifteen inches high, and three to six broad. One of the most beautiful of the genus. Native of tropical America.

S. delicatissima.—As its name implies, an elegant and delicate species. The stems are decumbent, producing from the under side abundance of roots, by which means it soon covers a large space, and makes a fine specimen: the leaves are small, and pale green in colour. A desirable stove kind, from Columbia.

S. denticulata.—This very pretty creeping kind, sometimes called *S. obtusa*, is a native of Central Europe, and will thrive well in the open air during summer, and in the cool house always; leaves dark green, and orbicular. It makes a very nice edging for the cool Fernery, and is well adapted for Glass Cases.

S. erythropus.—A very fine caulescent species, producing stems from ten to fifteen inches in height, and ten in breadth, dark green above, paler below, broadly triangular in shape. This beautiful massive-looking plant should be generally cultivated. An evergreen stove kind, from tropical America.

S. filicina.—This grand plant has obtained the name of *S. dichrous* in some gardens, but whatever be the name given it, the plant should be in every collection. When well cultivated, it will produce an abundance of branching stems from eighteen inches to two feet in height, and upwards of a foot in width; colour brilliant green; the stem is bright red below, about six inches being destitute of foliage. A stove species, from Columbia and Peru.

S. flabellata.—A distinct and handsome plant, from Columbia and Peru; upright in growth, and from eight

to fifteen inches high, and six in breadth, of a very deep green colour. A stove species.

S. Galeottii.—This is a very beautiful sub-erect growing kind, known also as *S. Schottii*. It produces long straggling stems, rooting from their under side; branches somewhat distant; leaves bright dark green. Native of Mexico.

S. Griffithii.—A very distinct species, the habit of which is sub-erect, the stems about ten inches high, and gracefully arched or pendulous towards the apex; colour pale green. A stove plant, from Borneo.

S. helvetica.—A beautiful close-growing creeping species, rising only a few inches from the ground, which it covers like a carpet with its brilliant green leaves and stems; it is admirably adapted for Fern Cases, or for rock-work, either out-doors in summer, or the greenhouse Fernery. Native of the Alps of Europe.

S. inequalifolia.—This is a very distinct evergreen stove kind; sub-erect in habit, producing stems from six to twelve inches high, and of nearly equal width throughout; fertile portion contracted, forming spikelets on the ends of the branches. Native of Java.

S. involvens.—A very handsome and hardy species, thriving admirably in the cool house; indeed, it is said by some to be perfectly hardy, but never having tried this, I am unable to say so much; it belongs to the rosulate section, is much branched with small closely set foliage of a light bright green colour. Native of India, &c.

S. Kraussiana.—This well-known and useful plant has long usurped the name of *S. denticulata*; it is a beautiful plant for rock-work, for edging, pot culture, for Glass Cases, or indeed any purpose you like to use it, either in the stove or greenhouse Fernery. It is sometimes called *S. hortensis*. Native of the South of Europe.

S. Kraussiana variegata.—A charming variety of the preceding, beautifully tipped with white at all the growing points; very effective for edging, or any purpose for which the former may be used.

S. laevigata.—This is a most beautiful object when used as a climber, more especially if it can be accommodated with a heavy shade. It is a tall scandent species, producing stems of indefinite length, usually from one to six feet long; branches somewhat distant, broad, and of a splendid metallic iridescent blue. A stove plant, often found in collections under the name of *S. caesia arborea*. Native of the East Indies.

S. Lobbii.—This is a fine robust caulescent species; it grows from eight to eighteen inches high, thickly branched, with broad dark green leaves, and producing masses of fertile spikes on the tips of the branches. An evergreen stove kind, from Borneo, &c.

S. Lyallii.—A beautiful and very distinct plant. It is an evergreen stove kind, the stems rising up singly from its underground stolon, from six to fifteen inches high, and ten in width; the leaves are of a ferrugineous green, and short but large fruiting spikes are borne at the points of the branches. Native of Madagascar.

S. Martensii.—A beautiful ornamental species, the stems of which are sub-erect, producing a great quantity of roots from the under side and lower parts, in which way it is easily increased; it grows about ten inches high, and the stems are densely clothed with broad dark shining green leaves. A native of Mexico.

S. Martensii variegata.—This is in every respect the same in habit as the preceding, but is profusely blotched with pure white, making a beautiful contrast with the shining green of its other leaves.

S. pilifera.—A handsome species of the rosulate section, oftentimes called the Bird's Nest *Selaginella*, and frequently confounded with *S. lepidophylla*. It is a rather difficult plant to manage well. I have seen it do best when grown under a bell-glass of about six or eight inches in diameter. It is a remarkable plant, throwing out its branches in a horizontal manner, and thus forming a flat top like a table; if suffered to get dry they all curl inwards and roll up into a ball. A stove species, supposed to be a native of Texas.

S. pubescens.—A very distinct kind, and one that succeeds well in a cool house. It is a caulescent species, and grows to about eighteen inches in height, by six or eight in breadth; the branches are much, and very prettily, divided; leaves small, and very close, of a dull deep green colour. Native of the East Indies.

S. rubricaulis.—This is a very pretty little species, slender and elegant in all its parts: the stem is slightly red below, and grows to about seven or eight inches in height, the branches being of a beautiful polished bright green in colour. It is a perfect gem for a Glass Case. Native of Western Africa.

S. sarmentosa.—This is a distinct creeping species, seldom more than a few inches high, but growing to a great length; the stems, which are slightly branched, have their growing points considerably in advance of any lateral shoots. A stove species. Native of the West Indies.

S. serpens.—A very distinct species, and one that enjoys a great variety of aliases, such as *mutabilis*, *variabilis*, and *jamaicensis*; it is one, however, that is easily told from any other. The plant is of creeping habit, feeling somewhat rough when touched by the hand; bright green,

the colour gradually fading towards evening to almost a pure white, and putting on its green coat again in the morning. It is a most interesting dwarf plant for a Wardian Case. Native of Jamaica.

S. sulcata.—A very rare species, and, at the same time, a very elegant one; it grows from six to twelve inches high, the stems slender, but little branched, and the large globose leaves somewhat distant; the apex of the branches thickened, and the sporangia situated in the axis of the leaves. A stove kind, from Columbia.

S. uncinata.—This plant is well known under the name of *S. caesia*; it is a creeping species, and succeeds well in a Basket if kept from the strong light of the sun; it will also make an interesting object in a Fern Case, with its blue and green leaves. A native of China.

S. viticulosa.—An elegant caulescent species, growing from ten to eighteen inches high, and eight in breadth; the stem is clothed with large imbricate leaves quite from the base, and thickly branched; the colour is a dull green above, and pale shining green below. An evergreen plant, from Columbia.

S. Wallichii.—This is the noblest species I have seen; to what size it will attain I cannot say, but, with its beautifully branched stems, thirty inches high, and the longest branches a foot long, as I have seen it, it makes a magnificent specimen, and becomes a rival of the Ferns for stateliness and beauty; the colour is a shining dark green, and the point of each branchlet is adorned with a fertile spike, nearly an inch long, lending additional grace to the plant. An evergreen stove plant. Native of Penang.

SELLIGUEA.

An interesting small genus, at present rare in cultivation. They should be grown in rough fibrous peat, with good drainage; the plants composing this family have been tossed about by various authors from *Polypodium* to *Gymnogramma*, *Grammitis*, &c.

S. caudiformis.—A very distinct and handsome Fern. The fronds are simple and entire, very firm in texture; the sterile is ten inches long and four broad, with a caudate apex, the stipes being about eight inches in length; the fertile frond is not more than about two inches wide, which causes the sori to be crowded; these form very broad and thick continuous single lines of dark brown spore-cases between the principal veins. Native of Java.

S. pothifolia.—This is a very handsome plant, totally distinct from the preceding; the fronds are pinnatifid, the pinnae about six inches long and one in breadth, light green in colour, and thin in texture. It is admirably adapted for a Wardian Case. Native of the Fiji and Philippine Islands.

STENOCHLENA.

A genus nearly allied to *Lomaria*, consisting of climbing Ferns of rapid growth, producing large fronds of two kinds, the fertile ones being contracted and wholly covered with sori. In some instances, the fertile fronds are bipinnate, and the barren ones pinnate only. The rhizomes require something to root in, as recommended for *Oleandra*, and if wanted to cover a wall or a pillar,

treated in that way they will soon make beautiful specimens. Some of these make fine objects for climbing a high wall where there is plenty of moisture. I have seen a surface of fifty feet covered with *S. tenuifolia*, and a charming effect it produced. They are also effective planted on rock-work, where there is depth of soil for them to be planted so that they may root freely.

S. heteromorpha.—An evergreen cool house Fern, very distinct in habit and appearance; it is a scandent species, and soon fixes itself on a log of wood or the stem of a Tree Fern. The fronds are pinnate, and, in the younger stages, some ten inches in length, with pinnae round and dentate on the margin, and deep green in colour; when more matured, they become much larger and longer, with the pinnae much more elongated. A very handsome little species, from New Zealand.

S. scandens.—Another noble scandent species, one of the finest for covering a wall or pillar, or putting upon a wire cylinder; the fronds are of two kinds, both of which are pinnate, the sterile of a beautiful bright green colour, and the fertile much contracted. An evergreen stove Fern, from the East Indies.

S. tenuifolia.—This noble Fern shows itself to advantage when climbing over a large rustic pillar. The fertile fronds are from one to three or more feet long, pendulous, very much contracted, and bipinnate, the pinnae six or seven inches long, and the spore-cases covering the whole of the under side. The sterile fronds are pinnate, pinnae about ten inches long, serrated at the margins, and bright green in colour. This plant was long cultivated under the name of *S. scandens*, from which, as will be seen, it differs greatly; it has also been called *S. Meyeriana*. An evergreen stove species. Native of South Africa.

STENOSEMIA.

This very handsome plant is the only one in the genus. It succeeds well grown in peat and sand in the tropical house, and as it makes a fine and distinct ornamental plant, it is a Fern that should be generally cultivated.

S. aurita.—A most beautiful Fern, bearing two distinct kinds of fronds, rising from an erect caudex. The sterile fronds are ternately pinnate, from six to eighteen inches high; pinnae laciniately lobed and viviparous. The fertile fronds are the exact counterpart of the sterile, with all the segments contracted so as to become linear, and wholly sporangiferous. Sometimes the plant will produce fronds of intermediate width, being fertile, but not so much contracted as a fertile frond usually is, nor so much developed as a sterile one. An evergreen stove Fern, which should be in every collection. Native of Java.

STRUTHIOPTERIS.

A magnificent family of Ferns, commonly known by the name of Ostrich Ferns, from the resemblance of the fronds to its feathers. They produce fronds of two kinds, and the peculiar way in which they grow in the mass, adds considerably to their beauty—the fertile fronds being always in the centre, with the sterile ones forming a circle around them. They are perfectly hardy, and can be readily increased by the underground stems, which extend for some distance round the plant. These Ferns should find a place in every Fernery, being the grandest of all our hardy species.

S. germanica.—This beautiful plant produces fronds of two kinds. The fertile frond is pinnate, from one to three feet high, and contracted; pinnae linear, with revolute con-

niving margins. The sterile are spreading, and beautifully arched towards the top, pinnate, the pinnæ being pinnatifid and light green in colour. A deciduous hardy Fern, from Germany.

S. pennsylvanica.—Another grand species for out-door Ferneries. It resembles the preceding very much, but is easily recognised by its larger size and more erect habit. This deciduous plant is a native of North America.

THAMNOPTERIS.

This genus consists of a few species producing entire fronds, and remarkable from the peculiar manner of their growth. The fronds rise up from the crown, leaving quite a hollow centre, from which habit they have been called Bird's Nest Ferns. They are very long-lived, and make splendid objects for Vases, to stand on each side of the doorway, inside the Fernery—or, indeed, *N. australasica* will answer well for this purpose out-doors in summer time, if not exposed to the full sun. These plants will require but little soil, as they make a mass of fibrous aerial roots on the surface, from which, if the atmosphere is in proper condition, they derive much nourishment. Rough fibrous peat, sphagnum moss, and lumps of sandstone suit it best.

T. australasica.—This fine evergreen species has been very aptly called the Bird's Nest Fern. The fronds, which are simple and elliptic-lanceolate in shape, and of a bright shining green colour, grow all round the rhizome, so as to leave the crown elevated and exposed, and thus form a hollow centre; their length is about four feet, and their breadth from three to six inches; the mid-rib below is sharply carinate, a character to be found in this species from its youngest stage. As it succeeds well in a

cool house, it becomes an invaluable plant where contrast and noble outline is studied. Native of New South Wales.

T. Nidus.—This is popularly known as the Eagle's Nest Fern, and is often confounded with the previous species; it is indeed similar in habit, and grows to about the same size; the chief differences being that in the present plant the fronds are almost of equal breadth to the base, with the mid-rib obtuse, and that they grow out horizontally at first before taking their upright course, thus leaving a much broader centre; it also requires the heat of a stove. Native of the East Indian Islands.

THYRSOPTERIS.

Of this genus only one species is known, and this requires the treatment recommended for the temperate Tree Ferns.

T. elegans.—This is a lovely plant, having in the young state somewhat the appearance of a finely cut *Davallia*; the caudex is arborescent, and the fronds attain to the height of five or six feet, a third of which is naked; they are decompound multifid, the fertile portions much contracted, and the colour a bright dark green. An evergreen cool house Fern, very rare in cultivation. Native of Juan Fernandez.

TODEA.

A small genus of highly ornamental and elegant Ferns. The first species described below is totally different to the others in texture, being coriaceous. Of *T. hymenophylloides* and *superba* I am the fortunate possessor of the largest specimens I have seen in cultivation. Of the first of these two species, the accompanying drawing gives a good idea. The stem is a foot and a half high, and two



TODEA SUPERBA. *Col.*

New Zealand.

feet in circumference. *T. superba*, the illustration of which conveys a better idea than words, is also a splendid specimen, the finest I have seen, being about three feet in diameter, and the fronds nearly six inches broad, with a very stout crown, and foundation for a stem. These two species, together with *T. Fraseri*, are thin in texture and membranaceous, and they all succeed admirably under the same treatment as the Filmy Ferns, such as *Hymenophyllum* and *Trichomanes*, which they resemble in the texture of their fronds. In potting, perfect drainage is essential, and good fibrous peat and a portion of silver sand is the best soil that can be used. They grow more rapidly in the tropical Fernery in a close Case, with an abundance of shade, and frequent sprinklings with water over the fronds. They also make fine objects planted in sheltered moist places in the Fernery.

T. africana.—This is one of the finest and most useful decorative plants for the conservatory or cool Fernery. The fronds rise from an upright stem to the height of four and five feet, and are bipinnate, coriaceous, and bright dark green in colour; the pinnules are sessile, serrate on both margins, with sori in lines densely covering nearly the whole of their under surface, and of a bright reddish brown. An evergreen temperate Fern, which should be in every collection; it, moreover, makes one of the finest of all Ferns for exhibition purposes. Native of South Africa.

T. Fraseri.—A rare and beautiful species, not so often seen in collections as it should be. It resembles the next (*hymenophylloides*) very much in appearance, but the fronds are longer, the pinnæ wider apart, the pinnules broader, and not divided into such fine and delicate segments. An evergreen temperate Fern, from New Zealand.

T. hymenophylloides.—This splendid Fern, of which I give an illustration, makes a stout stem with age, but how long it takes to grow to the size shown above, is impossible to say. It is very slow in making a stem in this country, and, judging from our experience of the plant, it is quite within reasonable bounds to suppose it to be fifty years old. The fronds of this splendid Fern vary from ten to thirty inches in length, and are bipinnate, triangular in form, very membranaceous, and pellucid; in colour a vivid dark green. No collection of Ferns, or Wardian Case of any kind, should be without this truly beautiful species. Native of New Zealand.

T. superba.—This exceedingly lovely plant, of which I give an illustration, it is impossible to do justice to either by words or even by the beautiful pencillings of a Fitch—it must be seen to be appreciated and enjoyed. This is, indeed, a gem, far beyond anything which this lovely tribe of plants has before yielded up to us, and, as it is quite at home in a Fern Case, no lover of Ferns should be without it, for nothing can excel the exquisite delicacy of its finely divided, undulating, and crisped fronds, which are of a vivid rich bright green colour, ovate-lanceolate in shape, and pendulous. A splendid plant for exhibition, and one which is always a great attraction. Native of New Zealand.

TRICHOMANES.

T. achillæfolium.—A fine upright-growing species, growing from nine to eighteen inches high; it requires extra heat and humidity to grow it satisfactorily, and thrives best in peat, moss, and small lumps of sandstone. Native of Java, Borneo, &c.

T. alatum.—This is a very handsome plant. The fronds



TODEA HYMENOPHYLLOIDES, *Rich.*

New Zealand.

grow upwards of a foot in height, and are pinnatifid; the rachis winged nearly to the base, light green, and very membranaceous; it thrives well upon a block of wood or sandstone. Native of Jamaica.

T. anceps.—The handsomest species I have seen, growing oftentimes upwards of two feet high by ten inches broad; and making a noble specimen. The fronds are triangular in form, of a very dark metallic green colour; the spore-cases hang like little bells from the under side. An upright-growing species, which thrives well if potted in fibrous peat, moss, and lumps of sandstone. Native of Trinidad.

T. angustatum.—A very pretty compact-growing species, with narrow bright green pinnate delicately cut fronds, about six inches high; it thrives either in a Glass Case or in the Fern house, when placed on a log or in a pot. Native of the West Indies.

T. attenuatum.—A very fine scandent species, in habit resembling *alatum*; it succeeds best upon stems of Tree Ferns or on lumps of sandstone. Native of the West Indies.

T. Bancrofti.—A handsome plant, with broad somewhat triangular-shaped pinnatifid fronds, from three to eight inches high, and about one in width. A very handsome species, bright green in colour, the stipes and rachis winged to the base. From the West Indies.

T. Bojeri.—A very small but interesting species, native of the Mauritius, whence it frequently comes, and nearly always upon Tree Fern stems, chiefly those of *Cyathea excelsa*, which it completely covers. It thrives beautifully in a Wardian Case.

T. crinitum.—This species grows about six inches in height, and is a pretty close-growing kind; it requires

to be kept very moist, but cannot suffer water upon its fronds. Native of the West Indies.

T. crispum.—A fine and handsome species, growing oftentimes a foot high; the fronds are pinnatifid, with obtuse pinnæ; sori exserted on the apex of the pinnæ, which are of a fine bright dark green colour. Native of the West Indies.

T. elongatum.—A very distinct and handsome plant from New Zealand, with an upright caudex, and bipinnate dark green fronds; it succeeds best in a pot, and is admirably adapted for growing in a Wardian Case.

T. fimbriatum.—This is a very handsome climbing species; the fronds are from six to ten inches in height, pinnatifid; the margins of the pinnæ undulate, and pale green in colour. Native of the West Indies.

T. floribundum.—This species I have hitherto found a difficult one to manage; it has always been sent me from the West Indies in a stiff yellow clayey loam, and should be potted in stiff soil, well drained in pots; it is a handsome and distinct plant, producing broad pinnate barren fronds, which are proliferous at the apex; the fruiting fronds are narrower, with the sori thickly set on the edges of the pinnæ, and much exserted, producing a novel and handsome appearance; the fronds are of a light lively green colour. It is found sometimes in collections under the name of *T. pennatum*. Native of Trinidad, &c.

T. javanicum.—A fine pinnate species, producing fronds from six to twelve inches long; pinnæ obtuse, and of a deep sea green colour; it should be grown in a pot, with sphagnum moss, peat, and sandstone. Native of Java.

T. Kaulfussi.—A strong-growing species, with broad pinnatifid fronds, oftentimes a foot long, requiring to be

potted in heavier soil than most kinds, and to have a copious supply of water. Native of the West Indies.

T. Kraussi.—A creeping species, which requires to be grown on a log of wood or Tree Fern stem; the fronds are from three to five inches in length, deep green in colour, and pinnate; pinnæ narrow. Native of the West Indies.

T. Luschnathianum.—This is a fine dark green climbing species from Brazil, which should be allowed to ramble over a block of sandstone, or trained upon the stem of a Tree Fern, where it would soon make a splendid object.

T. membranaceum.—A dwarf climbing species from the West Indies, with very dark green simple fronds, in some plants roundish in shape, in others lengthened out, with lacerated margins; it should be grown on a lump of sandstone. A very distinct and handsome species.

T. muscoides.—A simple-fronded climbing species, two or three inches long, and very bright green in colour; it should be planted on a thick log of wood, which it will rapidly cover, and form a beautiful mass, either in the Fernery or under a Wardian Case. Native of the West Indies.

T. Pluma.—This very handsome species is extremely rare. The fronds are most beautifully and finely divided, giving it the appearance of a large feather. It has an upright caudex, with fronds from six to twelve inches in height. Native of Borneo.

T. pyxidiferum.—This species has a very wide range of growth, being found in West Africa, Brazil, the West Indies, and, indeed, nearly all over the tropics, and varies much in appearance. The fronds are twice or three times divided; it should be grown upon a Tree Fern stem or log of wood, where it makes a very pretty object, and

thrives well in a Glass Case, or shady nook in the Fernery.

T. radicans (The Killarney Fern).—This splendid plant, though not often seen in a wild state in our own country, is nevertheless widely dispersed, being also found in Madeira, the West Indies, and Brazil. The fronds are broadly triangular, bi-tripinnatifid, growing a foot or more in length. It succeeds well planted in rough peat and sphagnum moss, with large lumps of sandstone, partially covered with the soil; or it will grow well entirely on a large lump of sandstone. Found in the East Indies, West Indies, Madeira, Canaries, Ireland, Wales, &c.

T. radicans Andrewsii.—A distinct and handsome Irish variety of the foregoing, having lanceolate fronds, of a deep green colour; it requires the same treatment as *radicans*, and, like it, makes a splendid object in a Wardian Case.

T. reniforme.—The most distinct of all the genus, having large kidney-shaped fronds, of a bright green colour, produced from a wiry ereeping rhizome. The sori, when present, stand out all round the edge of the frond, giving it a remarkable and handsome appearance, which will be better understood by the figure. It succeeds well planted in rough peat and large lumps of sandstone, in either house, or in a Wardian Case. Native of New Zealand.

T. rigidum.—A handsome species, of a dark green colour, widely dispersed over the tropics, being found abundantly in the West Indies, New Granada, Brazil, and West Africa. An upright-growing plant, with triangular-shaped fronds, from eight to twelve inches high. It should be grown in a pot with peat, moss, and some lumps of sandstone.



TRICHOMANES RENIFORME. *Forst.*

New Zealand.

T. rufum.—A very raro, distinet, and beautiful Fern. The fronds are about ten inches in height, and one and a half in breadth, pinnate; the pinnæ overlapping each other, and the veins exserted at their apices. The stipes and under side of the frond are most profusely covered with long rufous woolly hairs; colour above pale green. It is an erect-growing plant, and should not be watered over the fronds. A native of Demerara.

T. sinuosum.—A handsome pinnatifid species, from three to eight inches long; it grows upon Tree Ferns and stems of trees, the thin pale green and almost transparent fronds rendering it a very pretty object. It is admirably adapted for a Fern Case. Native of the West Indies.

T. scandens.—A very handsome scandent-growing kind, producing fine long pubescent fronds, light green in colour, and from eight to eighteen inches in length. It must be grown on the stem of a Tree Fern or log of wood. Native of the West Indies.

T. trichodeum.—A perfect little gem, growing from three to ten inches high. The segments of the fronds are very finely divided, and the spore-cases, which are like little cups, stand up very conspicuously among them, giving it a remarkable and elegant appearance. It requires to be grown on the stem of a tree of some kind. Native of the West Indies.

T. venosum.—This pretty little greenhouse species frequently arrives in this country upon the stems of *Dicksonia antarctica* and other Tree Ferns. The fronds are from four to six inches in length, pinnate; pinnæ small and linear, very thin in texture, and bright shining green in colour. It makes a pretty specimen in a Wardian Case, when grown upon a block of sandstone. Native of Tasmania, New Zealand, &c.

T. Zollingeri.—A fine strong-growing plant, in the way of *javanica*. The fronds are simply pinnate; the pinnules more rounded than in the species just named, and of a very deep rich green colour. Native of Java.

WOODSIA.

A small genus, which includes two species indigenous to Britain, though with us they are extremely rare. The members of this family seem to affect cold countries, for our own species thrive best on the high mountains of Seotland, and extend their range northwards into Lapland. The exotic species of this genus make very handsome little plants, and should be carefully attended to, as they are always interesting objects. The plants should be grown in good fibrous peat and sand; the temperate house suits them well, in company with, or in similar situations to these recommended for, many of the species of *Cheilanthes* and *Nothochlænas*; they will live in the open Fernery in ordinary winters, but are more interesting when grown under glass.

W. mollis.—This is a very distinct and handsome species, growing from ten to twenty inches high, lanceolate in shape, and bipinnate; light green in colour, and hirsute, which gives the softness that has originated the name. A deciduous greenhouse Fern, from Mexico.

W. obtusa.—Another very handsome little Fern, which although, I believe, perfectly hardy, yet thrives best in the temperate house. The fronds are from nine to twelve or more inches long, bipinnate, with the segments deeply pinnatifid; pinnæ somewhat triangular in shape, and of a pleasing light green colour. A hardy deciduous species. Native of various parts of North America.

W. polystichoides.—A most beautiful little Fern, growing

from four to eight inches high. The fronds are densely scaly, pinnate; pinnae obtuse, crenate at the apex, and auriculate on the upper margin. I am not aware if this has proved hardy, but it is a charming addition to this family, for the crevices of rocks in the cool house. Native of Japan.

W. polystichoides Veitchii.—The plant I have seen in cultivation under this name differs from the above in having longer and broader pinnae, frequently auriculate on both margins, and in being less scaly, and stronger in habit. It is a very handsome plant, also a native of Japan.

WOODWARDIA.

This fine genus consists of highly decorative plants, thriving well in the temperate house. The broad and beautifully arched fronds of *radicans* make one of the finest objects imaginable, especially when planted in some centre Vase, slightly raised above the level of the eye, and it is also a fine plant for a large Basket. Another species is viviparous on its whole upper surface, and the young plants standing erect upon the fronds resemble somewhat a miniature forest. They should be potted in a mixture of loam, peat, and sand, and enjoy a liberal supply of water both at the roots and on the fronds, in light showers from the syringe.

W. areolata.—A fine distinct species, which is perfectly hardy, but which well deserves a place in the cool house. The fertile and sterile fronds are dissimilar; the sterile ones are erect, sub-pinnate, from twelve to eighteen inches high; pinnae broadly lanceolate in shape, the margins serrate, and bright light green in colour; the fertile differing in having the pinnae contracted;

the rhizome is creeping underground. A handsome deciduous species, which must not be allowed to get dry during its period of rest. Native of North America.

W. japonica.—This is a fine distinct and handsome Fern for the cool house. It grows from one to two feet high; the fronds are pinnate, the pinnæ broad and pinnatifid, with all the lobes of the pinnæ serrated on the margins; colour dark heavy green. An evergreen species, native of Japan.

W. orientalis.—This fine noble-growing plant is a splendid object in the cool Fernery. The fronds are bipinnatifid, from two to four feet long, and very broad, bearing on the upper surface a profusion of little bulbiform plants. An evergreen species, well worthy of cultivation, and will make a good one for Baskets. Native of China and Japan.

W. radicans.—This is a grand plant for the cool Fern house, and has a beautiful effect when planted in a Vase standing upon a high pedestal. The fronds are produced from a decumbent rhizome, varying from two to six feet in length, viviparous near the apex, and of a rich bright green colour. An evergreen plant, and one of the finest for exhibition. Native of Madeira, Northern India, and California.

W. virginica.—A very fine and strikingly handsome Fern. The fronds are produced from an underground creeping stem, and are from one to two feet high, bipinnatifid, and of a pale green colour. It is a deciduous species, and will live in the hardy Fernery through ordinary winters. Native of North America.

XIPHOPTERIS.

Of this genus only one species is in cultivation in our gardens, and it often dies through bad management. It

has a sub-erect rhizome, from which the fronds are produced in great profusion, bearing confluent sori, close to, and parallel with, the mid-rib, but only on the upper portion of the fronds. It should be grown in the crevice of a block of sandstone, or potted in small pieces of that material, with the addition of a little peat.

X. serrulata.—A pretty little distinct Fern, the fronds of which grow from two to four inches high, entire, linear, and deeply serrate on the margins. The colour of the fronds is bright green. It makes a charming little plant in a Wardian Case, and is totally distinct in appearance to any other Fern in cultivation. It is common in Trinidad and the various West Indian Islands.

BRITISH FERNS.

INTRODUCTORY REMARKS.

FERNS, as before observed, affect shady places, and those who take an interest in plants or in gardening can scarcely spend a little time more pleasantly, on a summer's day, than in searching out these beautiful objects in their cool retreats, more particularly when they grow near the margins of a stream, whose banks are furnished with rustic seats, on which the visitor may sit and admire the noble outline and elegant fronds of some of the larger species, their exquisite fronds half covering the rocks, or bending gracefully over the water.

Since the publication of the "Hints on Cultivation of Ferns," a complete revolution has taken place, for not only have the lovers and growers of these plants vastly increased, but the plants themselves have assumed such varied and extraordinary forms, that in many instances the normal state, or parent, cannot be recognised, and so numerous have they become, that many hundred variations of our forty or more British species have been named and described. As mentioned in the portion of

this work devoted to the tropical kinds, Ferns seem to be altogether unwilling to be left behind by the fashionable world, so that when variegated foliage came into repute they also yielded their quota, and our native species have not been behind their exotic relatives, for *Asplenium Adiantum-nigrum* has produced a form in which many of the pinnæ are white, our common brake (*Pteris aquilina*) has assumed a variegated garb, and the Hart's Tongue (*Scolopendrium vulgare*), amongst its countless forms, has also changed some of its vivid green for a parti-colored frond. Variegation, however, is the least of the changes they have assumed—erests at the apex of the fronds, and crests on the ends of each pinnæ, forking of fronds, undulations on the margins, the broad and undivided species becoming finely cut, and those with small segments becoming broad: indeed, the variations are so fantastic and numerous, yet so beautiful withal, that it is hardly possible to conceive so many forms should have either sprang into existence within a few years, or have been passed by unnoticed for so long.

The refinement and improvement of our national taste, and the opening up of the country by railways, has vastly extended our knowledge of these plants, as well as the area of their cultivation. The number of tourists has been much increased, and many of these, inspired with a love for Ferns, gather all the fresh forms that can be got at the particular place at which their inclination has induced them to spend their leisure time or their holidays. Thus, the greater part of our land has been searched over for these plants, and still fresh varieties appear, as distinct as the earlier ones, and apparently more and more beautiful. And what can be more delightful or healthful than a ramble in the lake

districts of Cumberland or Killarney, a tour among the glens and mountains of Wales, or the lochs and hills of the Scottish highlands, and all these are rich Fern-producing localities; thus, while experiencing delight at discovering some new gem for the rock-work or Wardian Case at home, you behold Nature in all her wild beauty—the blood flows briskly through the veins, bringing back that glow of health which perchance has been somewhat dimmed by the close atmosphere of the city, and which might never have been restored but for the love of Ferns.

The pleasure to be derived from these plants does not indeed end with gathering them; for, beyond this, the care required in watering and tending them when brought home and planted either in the rock-work or Wardian Case, and the watching the delicate fronds as they unfold, is a never ending source of amusement and gratification; and if sufficient leisure can be devoted to their study, an immense source of enjoyment is open to the lover of these plants, by raising them from spores. In this way countless numbers of new varieties may be added to those we already possess, if a proper selection is made; thus, if crested forms are wanted, the spores should be taken from the finest crested variety already grown, or if any peculiar character has developed itself upon a frond, let the spores be gathered from that, in order to perpetuate it; in this way, with constant care in the selection, it is impossible to say to what extent the variation of our British varieties will reach, every fresh variety adding additional beauty to our open air rock-work.

Our hardy Ferneries present a very different appearance now to what they did a few years ago. Then we

had only the tropical forms of the species, with the addition of one or two variations, such as *Polypodium vulgare cambricum*, *Scolopendrium vulgare crispum*, &c. ; now, with our innumerable varieties, we are enabled to so diversify them, that if properly constructed and tended, a rock-work Fernery is an ornament of no mean beauty in any garden ; and as we have also added considerably to our stock of hardy exotic species by introductions from North America, Japan, China, Chili, New Zealand, Australia, and Northern India, a still greater contrast of foliage can be made.

Many of the Tree Ferns obtained from the temperate regions will, I have no doubt, be found sufficiently hardy to stand our climate without injury, and if not, they should be stood out in sheltered places during the summer months, and removed to some place for protection during winter ; their stately stems would give a fine tropical appearance, and add materially to the grandeur and interest of the Fernery. But where no accommodation can be afforded for such plants during winter, the effect of Tree Ferns can still be had, for by purchasing a few dead trunks of such as *Dicksonia antarctica*, and planting some of the large-fronded British kinds in them, a very fine effect can be produced ; and as these stems are easily to be obtained, on account of many arriving in this country dead, I hope to see them more generally used.

British Ferns, like the exotic ones, are useful for bouquet making, as well as for mixing with cut flowers in vases, or for the decoration of the dinner table. I have described the best varieties ; in addition to the species in the following pages, many hundreds more could have been added, but as it is not my intention to describe all

the forms known, but only some of the best and most distinct, I must refer my readers to those works specially devoted to that purpose.

CULTIVATION IN POTS.

BRITISH FERNS produce a highly pleasing effect in pots, more especially if they are placed under glass; as, for instance, in a grape house, or any other house or pit where there is a little heat and shade. I have had them succeed admirably well in such a situation, making much finer plants than out of doors if they are put under cover early in spring. Some of them are supposed to be difficult to grow, but I think, if my instructions are followed, little difficulty will be experienced in their cultivation. Ferns, like other plants, require care and attention to grow them well; but what plant can be grown in a pot successfully without these requisitions? It is as easy to cultivate plants well as it is to grow them ill; the chief things they require are to be properly potted, to be placed in a favourable situation, and to receive attention afterwards in reference to moisture at the roots.

Different kinds of Ferns must receive different modes of treatment; some are quite hardy, while others require protection all the year. No family of plants are more peculiarly suited than Ferns to persons with limited means, especially in relation to space, for a collection of British Ferns in pots need not occupy much room; some of them require to be grown under bell-glasses, such as *Trichomanes radicans*, *Hymenophyllum tunbridgense*, and *H. uni-*

laterale; these require a warm shady place to grow them to perfection, for they are generally found in wet places, near waterfalls and on damp rocks. I always grow them under bell-glasses in a warm house, with the temperature ranging from 40° to 45° in winter, but they may be grown in a cooler place, and will succeed in a cool frame, provided frost is kept from them; they will take no harm in a temperature about three or four degrees above the freezing point. I have seen small houses on purpose for growing these three kinds in; they were planted on rock, kept well moistened and shaded from the sun; and the plants were covering some yards of the surface of the rocks.

I have grown them in two or three different materials, but find the following to be the best, viz., silver sand and sphagnum moss, with some broken sandstone. Broken pots may be substituted when it is not easy to get sandstone, but the latter suits them best. These kinds should be grown in pans with good drainage; and nearly filled with broken pots or sandstone, to which is added a good layer of sphagnum, about one or two inches thick, and pressed firmly on the top of the drainage, in order to prevent the sand from sifting through; about one inch and a half of silver sand should be placed on the moss, and afterwards the plant on the top of the sand, so that it is about three inches above the rim of the pan. When finished, a gentle watering should be given with a rosed waterpot, and a bell-glass selected to fit the pan, and kept nearly close. The glasses should be kept perfectly clean inside and out; for if allowed to get dirty, the fronds will become weak and dwindling.

These plants should never be allowed to get dry, but

should have abundance of water in the summer season, and this should be applied by means of a fine resed waterpot, or syringe, ever the frends. They delight in this treatment, being mostly found growing in damp places where the spray of water falls upon them, but they do not require so much in winter, as in summer. During the dull season just enough should be given to keep the reets and frends damp. They should always be kept in the shade, and the sun never allowed to shine on them, for if that occurs they will not thrive. All the ether species of British Ferns can be grown in pots, but require different treatment from that just mentioned; these like plenty of air, but not much sun, with a goed supply of moisture, as many of them are found in damp places. For several years I grew a ceelection of British Ferns in pots, for the purpose of exhibiting them at the London shews, at whieh, as already stated, I have been very suecessful in obtaining first prizes, beth at the Hortieultural Society and Regent's Park. They were kept in a late vinery, where there was a little heat to bring them on in time for the May shew. The house was treated for the vines and net for the Ferns; but the latter seem to enjoy the warm moist atmosphere, and their presence is benefieial rather than otherwise when the house is first shut up, for the vines require a goed degree of moisture at the time they are breaking, and that is also what the Ferns delight in. Give them a goed syringing twiee a day in fine weather, viz., early in the mornning, and again when the heuse is shut up in the afterneon. This creates a moist atmosphere, in which the Ferns inerease in size very fast. Keep them in the vinery till June, when they should be meved into a shady part of the garden, where no sun

can get at them. If the rays of the sun are allowed to reach them after coming out of the vinery, they will be sure to scorch, thus making their fronds turn brown. Something should be laid down for them to stand on, such as pieces of slate or other material; they must not stand on the earth, or worms will enter the pots and stop up the drainage, which will be injurious to the plants, and cause the soil about their roots to become soddened—an occurrence which will most likely kill the plants, for they require an abundance of water during their growing season, and good drainage, which is essential to the growth of all plants, whether they are in a pot or planted out in the open ground, as it allows the water to pass off quickly. During their season of rest water them very sparingly, giving only just enough to keep the soil damp; but never allow them to get dry, for if so, they will most likely perish. I lost a fine plant of *Woodsia ilvensis* some years ago, in a house in winter, by letting it get dry; that taught me a lesson not soon to be forgotten. It was the only Fern lost by me in winter, and that was caused by too kind treatment, thinking to give it the “best place in the ship,” but in this case it proved to be the worst. Other plants of the same kind under different treatment were saved. These potted, and put into a warm damp house, made good plants by the first show, and are now in as fine condition as the one that was lost. A cool damp pit is the best place to keep them in during winter. It should have glass on the top, air given every day, and the lights covered up when it is likely to be a frosty night, as the frost should never get to the tender species, but in the case of the more hardy kinds a little frost will not hurt them, provided the pots are kept from it; if the pots become frozen the roots will

be injured: the pots are best plunged up to the rim, which will preserve the roots from frost. This is of great importance to all plants when grown in pots, whether they be hardy or not. Where Ferns in their wild state are found growing in exposed situations, there is generally some protection to keep off sharp frosts from their roots—such as trees, brushwood, fallen leaves, and rough grass, and the old fronds of the Ferns themselves afford some protection. In pots, however, more protection is required; and as I have already said, a cold damp pit is best suited for them in the winter season. Where there are not the means of growing them in a glass house, or if they are not wanted for exhibition early, they should be kept in the pit till June, and then removed to some shady part of the garden, where they will start and make good plants, with proper attention, as regards water and shade; and always bear in mind not to put them in exposed situations, where the wind cuts them to pieces—though they are hardy, they do not improve by being cut about with the storms and wind, if you want to keep their fronds perfect.

ON POTTING AND SOIL.

The best time of the year for potting British Ferns is the beginning of March, after their resting season. My practice is to pot all Ferns once a year, except *Hymenophyllum tunbridgense*, *H. unilaterale*, and *Trichomanes radicans*; for these once in two years is sufficient; turn the plants out of the pots, shake off some of the

soil, and if they require larger pots give them, if not, put them into the same size again, with fresh drainage and soil. Some of the small-growing species should never be put into larger pots than the size of the plants requires, but the strong growers require large pots to have them in perfection.

The soil best suited for pot Ferns is turfy loam, peat, and leaf mould, in equal parts, mixed with a portion of drift sand, all being chopped well together. I always give the stronger-growing Ferns their soil in a rough state, but the more delicate species require it made much finer, with a good quantity of silver sand mixed in it. This makes them root more freely. In potting give good drainage, and have your pots perfectly clean. If your plants are ready for potting, turn them out of their pots, and shake off some of the old soil, but be careful not to injure the roots and young fronds; then place in the bottom of the pot about two inches of drainage, then a layer of sphagnum or rough peat. This is of great importance to their successful growth, as it keeps the soil from stopping up the drainage. Then fill up with soil, placing the plant in the pot so that the crown is about level with the rim; press the soil firmly round the plant, and finish by giving a gentle watering with a rosed waterpot, to settle the soil. Always keep in memory not to give too much water till the plant begins to make fresh roots. If kept too wet before the soil becomes soddened, and afterwards injurious to the plant.

WATER.

THIS is an important item in Fern culture. Ferns require an abundance of water during the growing season,

both at their roots and over their fronds; they should never be permitted to get dry. Some of the species like more than others; as, for instance, the *Osmunda regalis*. I generally water them once a day in summer, but that must be according to the weather. If dry, they will require it, but in damp, dull weather, they will not need it so often. Rain or pond water is the best for all plants, but where this cannot be obtained, and pump water is used, it should never be applied when fresh pumped up from the well, but be allowed to remain for some time exposed to the air. Watering Ferns should be done with great care, and not thrown over their fronds, as I have seen Fern growers do, but it should be applied to their roots with the same care that is bestowed upon other plants, and when they require it, on their fronds; let it be done with a syringe, or an engine with a spreader on the hose.

INSECTS.

BRITISH FERNS are not subject to many kinds of insects. Their greatest plague is the brown scale, which appears on the fronds when they are growing under glass. The way to get rid of this is by placing the plants in autumn and winter so that the frost can get at the fronds, but not the roots. The green fly will sometimes make its appearance in spring and summer on the young fronds; they may be got rid of by means of tobacco smoke, but do not give it too strong, or it may injure the fronds. It best to give them a little two or three times, till the insects are destroyed. The evening, when the house is shut up, is the best time for this operation. The thrips

will often attack them if kept under glass too long, especially such plants as *Scolopendrium*, *Polystichum*, and *Polypodium*. These can be got rid of by tobacco smoke; but when you find this insect attack them, pot them out of doors in a shady place, after you have given them a smoking. Sometimes slugs interfere with the small delicate-growing species. These should be looked after, and destroyed before they do mischief; the best time to look for them is in the evening, or after the plants have been watered, as they then come out of their hiding places to seek food.

ON THE CONSTRUCTION OF A FERNERY, AND THE MATERIAL MOST PROPER FOR THAT PURPOSE.

THE most suitable place for forming a Fernery is in a secluded spot, in some shady part where trees overhang a stream of water, shade and water being both very essential to the growth of Ferns. But I should not recommend trees for the centre of a Fernery; let the space be open, so that the Ferns get air and light, for though requiring a certain amount of shade, yet they grow stronger if they get plenty of light, so that the sun does not shine on them too hot. Some of our native kinds are found in damp situations; the Royal Fern, for example, inhabits boggy places, and many others are found in similar habitats. Of course, under artificial treatment, these all require a damp place. The late Dr. Lindley, some years ago, informed me that he had seen the *Osmunda regalis* growing in a boggy place to the height of five or six feet. This is one

of the noblest of all British Ferns, and one that blooms from the top of the frond; by planting it near water you may have it in full perfection, and when such is the case it is a truly beautiful object. Nature should always be studied, and any one about to make a Fernery, should, if possible, see some of the beautiful glens and waterfalls where our native Ferns luxuriate in a wild state.

Every Fernery ought to be made at some distance from the dwelling-house if possible, with a shady walk through a shrubbery, or an avenue of trees, which will make it very pleasant on a hot summer's day. It ought to be in the middle of a plantation, or in some spot where there are sloping banks, and old stumps of trees placed in different parts; also some rock-work, which should be made with burnt bricks, commonly called burrs: these are bricks run together, which may be had from the brickfields in large masses in some parts of the country; but where masses of stone can be procured it forms better rock-work than bricks, and its appearance is more natural.

As I have said before, Mr. James Pulham, of Broxbourne, Herts, is the best hand at building rock-work that I have seen, and he has been employed by many gentlemen in different parts of the country in executing works of that kind. All the rock-work in the garden of C. B. Warner, Esq., of Hoddesdon, is formed with burrs and common cement, and built according to the size and shape required. It is done by mixing up some common cement with drift-sand, which, when spread over the burrs, covers every part, and when the cement is set, is a good imitation of stone. It stands well for years, and some done in this way has been built twenty years

or more. Imitation rock-work, put together with cement, without covering the burrs, is not so expensive as the former, but it ought to be made carelessly and rough, in imitation of rocks. Some crevices should be left for the small species to be planted in; and always bear in mind not to leave the crevices too small, as this is often the case with those who build rock-work; keep one thing in view, and that is, not to make the rock-work the principal object, but leave sufficient room for the soil, so that the Ferns may establish themselves in order to be able to withstand the dry weather. Hollow caves should be made in different parts, for the purpose of sheltering or otherwise favouring the growth of the more tender varieties, as several of our native Ferns are found in similar situations. *Adiantum Capillus-Veneris* (the Maiden Hair), *Asplenium marinum* (the Sea Spleenwort), and *Trichomanes radicans* (the Bristle Fern), are species which are all found in damp caves, and attached to moist rocks near the seashore.

Some rock-work ought to be made in large masses, and cavities left large enough in different parts of the rocks for placing some earth for large-growing Ferns to be planted in. In forming these, rocks should be imitated as nearly as possible, but they must not be made too formal; the rougher they are the more natural they look, and the more readily Ferns flourish among them. These rocks ought to be placed in shady parts of the Fernery, for different kinds of mosses to grow upon, as well as for the Ferns. The seedling Ferns will spring up in the crevices, and form objects of great interest, reminding one of them in their wild haunts, where these plants are seen to the greatest advantage, and always admired by lovers of Nature. A collection of British mosses will

be very interesting growing over the rocks, for which purpose they must be kept well supplied with moisture. There should be a number of old pollard trees placed in different parts of the Fernery, some of them eight or ten feet high, for the purpose of planting Ferns upon: there must be room on the top of the trees for sufficient earth for the Ferns to be planted in. Some of our native sorts are found growing on trees, such as *Polypodium vulgare*, &c.; and I have seen trees covered with this charming plant, with fronds as much as a foot and a half long. This Fern has a creeping caudex, so that by planting them on the top of the tree they will soon cover it, and form a beautiful and attractive object. Stumps often look well laid down in different parts of the Fernery with common ivy overrunning them, and the *Polypodiums*, and other kinds, planted on the top. The small-growing ivy that is found in hedgerows and woods, and some of the variegated varieties, are the best, and the trees should be the roughest that can be procured. I have used hornbeam, which is well suited for this purpose; but it does not matter what kind of tree so that it is a rustic pollard. Those trees that are to be fixed upright must be cut long enough to allow them to be planted in the ground to make them stand firmly; they ought to be placed in different parts of the Fernery, so as to appear as if they had been growing there for years, with some ivy planted at the bottom for the purpose of covering the stems. A few rustic arches look very well in different parts, made with rough burrs, and put together with cement. Some of the different kinds of climbing plants look very well running over these arches, such as the common Travellers' Joy, *Clematis Vitalba*, the common Honeysuckle or Woodbine, *Lonicera Perichlymenum*—

the flowers of which are very sweet and grateful. In forming a Fernery, serpentine walks are preferable to straight ones, as it is more interesting to examine the different species and objects at varied points. Edgings of *Polypodium vulgare*, and its varieties, have a pleasing effect on the sides of the paths. There should also be one or two summer-houses in the Fernery, made with rough wood on burrs, with climbers trained over them. If a stream of water runs through it, there ought to be some pieces of rock overhanging the stream, for the purpose of planting some of the Ferns on, such as the common Hart's Tongue, *Scolopendrium vulgare*; this plant delights in such situations, and being of a drooping habit, and evergreen, it creates a fine effect all the year round. I have seen this plant growing on the banks of a stream of water with fronds three feet long.

A waterfall would be a great improvement in the hardy Fernery; this can be easily formed if there is a stream near, by heading the water back to the height that is requisite for the fall. For this purpose a strong wall should be built with bricks and cement; after the wall is finished, then build some rock-work up to it with burrs and cement, and it will look best if made in imitation of stone. The rocks ought to be so placed that the water may flow over them, and a few pieces thrown carelessly in the bed of the stream, but let them be as rugged as possible, and some of the rocks protruding out of the water, so that some Ferns may be planted upon them; with the moss and Ferns above the stream, the effect will be very pleasing. A bridge made with rough wood, with the bark on, would also look well near the waterfall, but burrs and cement will be the most durable, as the wood does not last long. Make

the bridge as rustic-looking as possible, and leave spaces at the sides for the Ferns to grow in. Put some climbing plants near them, and train them carelessly, so that they present a natural appearance hanging over the stream.

Where there is not the means at hand of making a large Fernery, a small one may be made, in any shady corner of the garden, for Ferns will thrive where many other plants will not grow; therefore any one taking an interest in them, can easily make themselves a small rockery, and furnish it with these favourite plants. I have often been surprised to see what interesting Ferneries have been made, in places that were unsightly to the eye, and useless for any purpose except rubbish corners, by covering them with some of our hardy British varieties, which may be collected at little expense from the banks and woods near home; and to collect one's own plants affords a great deal of pleasure and amusement.

HARDY AQUATIC PLANTS FOR THE LAKE OR STREAM OF WATER.

- Acorus Calamus* (Sweet Flag)
- Alisma lanceolata* (The Lance-leaved Water Plantain)
- *Plantago* (Great Water Plantain)
- Aponogeton distachyon* (Two-spiked Arrow Grass)
- Butomus umbellatus* (Flowering Rush)
- Caltha palustris* (Marsh Marigold)
- Carex aquatilis* (Water Carex)
- *paniculata* (Great Panicked Carex)
- *pendula* (Great Pendulous Carex)
- *riparia* (Great Marsh Carex)
- Cladium Mariscus* (Prickly Sedge)
- Cyperus longus* (Sweet Sedg)
- Epilobium angustifolium* (Narrow-leaved Willow Herb)
- *hirsutum* (Codlins and Cream)

- Equisetum hyemale* (The Rough Horso-tail)
- *limosum* (The Water Horse-tail)
- *Maekayi* (Maekay's Rough Horse-tail)
- *palustro* (The Marsh Horse-tail)
- *Telmateia* (The Great Water Horse-tail)
- Hottonia palustris* (The Water Violet)
- Hydrocharis morsus-ranæ* (The Frog Bit)
- Iris laeustris* (The Marsh Iris)
- *pseudo-Acorus* (The Yellow Water Iris)
- Menyanthes trifoliata* (The Three-leaved Buck Bean)
- Nuphar advena* (The Stranger Water Lily)
- *lutea* (The Yellow English Water Lily)
- Nymphaea alba* (The White English Water Lily)
- Polygonum amphibium* (The Water Buckwheat)
- *Hydropiper* (The Water Pepper)
- Pontederia cordata* (The Heart-leaved American Pontederia)
- Ranunculus Lingua* (The Great Spearwort)
- *aquatilis* (The Water Crow-foot)
- Rumex Hydrolapathum* (The Great Water Dock)
- Scirpus laeustris* (The Tall Bullrush).

ON PLANTING, AND THE SOIL MOST PROPER FOR THAT PURPOSE.

AFTER the Fernery is constructed, the next thing to be considered is proper soil for the plants. They should have good material to grow in, if perfection in their culture be desired. Those that are found on old walls and rocks do not require so much earth to grow upon as others; nearly all the small-growing Ferns are found in such places, and they require a lighter soil than the stronger-growing species. The best soil for the small kinds is leaf mould, rotten turf of a loamy texture, and some peat, in equal parts, together with a good quantity of drift-sand mixed with the material; chop it well with a spade, so that the whole is rather fine, but do not sift it. The more robust-growing Ferns require stronger soil; they are generally seen in their wild state on banks,

but sometimes on level ground, and succeed best in a mixture of rotten turf, loam, and peat, in equal parts, mixing them well together, and chopping with a spade, but not too fine. These like the soil rather rough, because the water passes off more quickly, for they require an abundance of water during their growing season, and by keeping the soil open, the water does not stagnate about their roots, which is very injurious to them.

It requires great care to place the different sorts, so that they do not overgrow one another. The stronger kinds should be planted in such parts of the Fernery as will allow them plenty of room to develope themselves and spread out their beautiful fronds. Many of them grow to a great size, and of course require plenty of room. Some plant all the species separately. Others grow them in masses of a dozen plants together, but the collection looks much better separate, and the genera and species should be planted alternately, so that more contrast in form may be obtained, which shows them off to more advantage. The larger-growing species require earth about a foot and a half deep, for some of this class send their roots deep into the soil, such as the common brake, *Pteris aquilina*. If the small growers are planted on the rocks, they will require from four to six inches of earth, in order to grow them in perfection. Some of them are found on walls without any soil to grow in, but only just the moisture and wall to cling to. I have seen walls covered with them, and on which they grew beautifully, but when moved from such places they require some earth to get them established; they will root freely enough provided they are kept damp, and are never allowed to get dry. The best time of the year for planting Ferns out into the Fernery is March, April, and May;

the more hardy species are best put out in March and April, and the tender kinds in May. The latter should be placed in the more sheltered parts of the Fernery, in places according to the situations in which they are found growing wild. The large growers should be planted at the back, and the small ones in front. Ferns such as *Polypodium vulgare*, *Blechnum Spicant*, *Allosorus crispus*, &c., &c., planted round the edge of the walks in the Fernery, make a capital finish, which may be done by placing some rough stone for them to spread among, and keep their fronds above the soil, and the plants derive benefit by their rhizomes elinging to the stones.

HARDY EXOTIC FERNS.

<i>Adiantum pedatum</i>	<i>Osmunda Claytoniana</i>
<i>Botrychium lunarioides</i>	— <i>gracilis</i>
— <i>virginicum</i>	— <i>spectabilis</i>
<i>Cyrtomium caryotidcum</i>	<i>Platyloma rotundifolium</i>
— <i>falcatum</i>	— <i>atropurpureum</i>
<i>Cystopteris bulbifera</i>	<i>Polypodium hexagonopterum</i>
— <i>tenuis</i>	<i>Polystichum acrostichoides</i>
<i>Dennstædtia punctilobula</i>	— <i>concavum</i>
<i>Diplazium thelypteroides</i>	— <i>falcinellum</i>
<i>Lastrea erythrosora</i>	— <i>lepidocaulon</i>
— <i>Goldiana</i>	— <i>proliferum</i>
— <i>hirtipes</i>	— <i>setosum</i>
— <i>intermedia</i>	— <i>vestitum</i>
— <i>marginalis</i>	<i>Pteris cretica albo-lineata</i>
— <i>Sieboldii</i>	— <i>scaberula</i>
— <i>sparsa</i>	<i>Selaginella denticulata</i>
— <i>varia</i>	— <i>helvetica</i>
<i>Lomaria alpina</i>	— <i>involvans</i>
— <i>chilensis</i>	— <i>pubescens</i>
— <i>magellanica</i>	<i>Struthiopteris germanica</i>
<i>Lycopodium dendroideum</i>	— <i>pennsylvanica</i>
<i>Onoclea sensibilis</i>	<i>Woodsia obtusa</i>
<i>Onychium japonicum</i>	— <i>polystichoides Veitchii</i>
<i>Osmunda cinnamomea</i>	<i>Woodwardia arcolata</i>
— — <i>angustata</i>	— <i>virginica</i> .

DESCRIPTION OF THE FERNERY AT BROX-
BOURNBURY, THE SEAT OF G. J. BOSAN-
QUET, Esq.

BROXBOURNE PARK is celebrated for the fine trees it contains, among which its oaks and Spanish chestnuts are exceedingly beautiful. A short and pleasant walk among these trees to the eastern side of the park leads through a plantation to the Fernery, which is situated in a sort of dell or hollow, excavated originally for the purpose of obtaining gravel. The spot lies low, and is well shaded and sheltered by the large and spreading trees that surround it. Through a rustic wooden gate you enter this secluded garden of Ferns, where all the plants seem to thrive so well, that you are led to think they are at home, growing luxuriantly in their native soil. A few trees of a shrubby kind have been planted in the centre and around the sides of the hollow. These sides are about twenty feet high, and have been formed into sloping banks, on which the several kinds of Ferns have been planted. The soil consists of sandy loam, mixed with peat. The Ferns are planted in groups, the several varieties of the same kinds being placed together, and I never saw any growing in greater perfection. The *Osmunda regalis* seemed quite at home; a beautiful *Polypodium Phegopteris* covered a space of six feet. Also a fine plant of *Woodsia ilvensis*, which stands the winter without any protection. Along with this was *Asplenium marinum*, which few Fern growers can manage out in the open ground; also *Adiantum Capillus-Veneris*. I was very much surprised to find the *Hymenophyllum tun-*

bridgense and *Trichomanes radicans* there. These had been out all the winter: they were planted in a small cave made of rough wood, having the two Ferns in the centre; the only protection was a bell-glass over them. *Lastrea cristata* was growing very strong—the fronds were as much as three or four feet high; also *Lastrea montana*. *Cystopteris alpina* was growing very beautifully, and *Polystichum Lonchitis*, of which there were several fine plants. Along with the British Ferns there were many tender exotic species, which are usually grown in hot-houses, such as *Adiantum hispidulum*, *Platyloma cordatum*, *Doodia aspera*, *D. caudata*, *Adiantum pedatum*, *Diplazium Shepherdii*, and *Platyloma rotundifolium*, all planted in sheltered parts of the Fernery. Along with these was *Selaginella Kraussiana*, which had been out three years, and was growing very luxuriantly. Mr. Fuller, the gardener, informed me that they had endured the winter without any protection except the fronds and the fallen leaves that had collected round them. This place is very much sheltered from the cold winds on all sides. At the bottom of the Fern-banks is an edging formed of rough wood, and a walk, which leads round the bottom of the bank to a summer-house, built with rough stones and cement. The walks through the centre of the Fernery are planted on each side with Ferns, and different kinds of our native plants. I noticed some very pretty British orchids, viz., *Orchis bifolia*, the Butterfly Orchis, *O. Morio*, green-winged Meadow Orchis, and *O. maculata*, spotted palmate Orchis, *O. viridis*, Frog Orchis, and the common Fox-glove, *Digitalis purpurea*, with many other British plants, which look well planted in different parts of the Fernery. There is no rock-work in this place, except the summer-house, but many old pollard trees lying in

different directions are planted with Ferns, and produce a good effect. The Fernery is laid out with much taste, and does great credit to those by whom it has been designed.

Since writing the above description in the "Hints on Cultivation of Ferns," I have seen many fine Ferneries, but all cannot be described here. Before closing this chapter, however, I must say a few words respecting one at the seat of W. J. Blake, Esq., Danesbury Park, Welwyn, Herts. It is situated some considerable distance from the mansion, in a beautiful dell in the centre of the park, surrounded with fine oak trees, affording abundance of shade and shelter for the most tender varieties. This spot has been made into a charming retreat by Mr. Parsons, who is a great lover of this class of plants. The rock-work is a very good imitation of sandstone, and many hundreds of the British varieties are here flourishing beautifully, due regard having been paid, when planting, to give each its proper place. Upon entering the glade, the banks on each side are devoted to the Lady Fern (*Athyrium Filix-fœmina*), and the innumerable forms it has assumed, producing the most beautiful and graceful effect I ever saw with these plants. Following the winding walks through this beautiful valley, fresh and handsome varieties meet the eye at every step; nor is the collection confined to the British species and varieties only, but a good collection of exotics are flourishing out-doors—indeed, I saw many kinds doing well there which are grown in the greenhouse by most people. But I should advise Fern lovers to visit Mr. Parsons, and see this charming spot and his favourites, our favourites, and, indeed, everybody's favourites having a taste for chaste and elegant foliage in preference to all flower.

FERNS FOR THE FLOWER GARDEN.

It is an acknowledged fact that the fronds of Ferns, arranged with cut flowers, for vases and similar places, harmonise well; and also, that a bouquet is not finished or fit to present to a lady, unless Ferns of some kind have entered into its composition. Such being the case, how is it that amateurs, as a rule, have completely banished them from the flower garden—why will they not have as good an effect when growing side by side? I say it is a mistake, and the sooner this is remedied the better; for, depend upon it, the present style of summer bedding is on the decline. Ferns may be used in the flower garden with advantage for edging, such plants as *Cystopteris*, *Polypodium vulgare* and some of its varieties, many of the forms of *Blechnum Spicant*, or *Asplenium Trichomanes*, being admirably adapted for such purposes. If wanted for the centre of a bed, what can be finer than a group of *Struthiopteris*, *Athyrium Filix-fœmina*, or many of its varieties? If for second or third row plants in the geometrical garden, what could be more beautiful than some of the varieties of *Polystichum angulare*, or the crested forms of *Scolopendrium*, relieving with their varied shades of green the dazzling and oppressive blaze of flowers only? Then, again, at many places in the pleasure ground where clumps or beds of flowers are planted, so that they are approached and seen unexpectedly, Ferns, either grouped as a whole or in company with the flowers, would have a much better effect. Of course, they will not thrive or show themselves to advantage in bleak exposed situations, neither will the pet bedding plants; but Ferns will succeed where not many other plants could live—for instance, under the shade

of spreading trees, where, if flowering plants, and indeed many shrubs, are planted, they only exist in a miserable way for a short time. Such places I would by all means diversify with these beautiful plants, and many of these or similar places are to be found in almost every establishment. For the decoration of small flower gardens, where spring bedding is carried out, they are equally at home, for nothing could make a finer contrast with yellow, white, or blue crocuses, snowdrops, or any of the yellow *Drabás*, than a band of *Asplenium Trichomanes*, dwarf forms of *Blechnum Spicant*, or *Asplenium Adiantum-nigrum*; for mixing with larger plants, such as *Cheiranthus*, *Arabis*, *Alyssum*, or *Aubrietia*, the crested Fern (*Lastrea Filix-mas cristata*), or the dwarf one (*L. Filix-mas pumila*), or many others, could be used with splendid effect. Mr. Gibson, at Battersea Park, has given an idea of what can be done in this way. I trust he will still persevere in this good work, and hope to see these plants largely used in all our parks and public gardens. I have often seen them used by cottagers, either planted in the front garden next the high road, or on the top of or all over a roadside wall, built with rough stones, some of the larger-growing kinds making a beautiful crown on the top, and the sides perfectly covered with such kinds as *Ceterach officinarum*, *Asplenium Ruta-muraria*, *A. Trichomanes*, *A. fontanum*, *Scolopendriums*, &c., mixed with some small-growing hardy alpine flowering plants, and the effect was really charming—such, indeed, as one seldom sees even in large establishments. I feel convinced that straight lines, a level surface, and costly architecture, enter too largely, as a rule, into the formation of a garden, to allow many beautiful groups of plants to be grown to advantage or in their natural way.

DESCRIPTIVE LIST OF BRITISH FERNS.

THE plan adopted with the Exotic species in the first part of this book has been followed here, so that when any species or variety requires special management, mention is made thereof in the heading to the genus. The whole of the species recognised as indigenous to the British Isles are given, and some few of the most handsome varieties of each species that have come under my own observation. The number of named and recorded varieties of British Ferns is upwards of eighteen hundred, and amongst these there must of necessity be many comparatively worthless to the great portion of Fern growers, either from their being inconstant in character, unhandsome in form, or varying in too trifling a degree to be easily distinguished, and therefore not worthy a place in a Fernery limited in extent, when so many handsome and distinct varieties are to be obtained. Those here given will be found worthy a place in every collection.

ADIANTUM.

The British Maiden-hair Fern cannot be generally cultivated in the open air Fernery; it requires the protection of a greenhouse or Wardian Case, and in the

latter thrives admirably, and forms a beautiful specimen. The soil best adapted for its culture is fibrous peat, leaf mould, and silver sand, in equal proportions, with the addition of a small quantity of loam. Thorough drainage must be always secured, as it is of the first importance; indeed, without it, success can never be hoped for.

A. Capillus-Veneris (Common Maiden-hair Fern).—This is the only species of this genus we have among our indigenous Ferns. The fronds are produced from a short creeping rhizome, and are bi or tripinnate, from six to fifteen inches high; the pinnæ and pinnules fan-shaped, cuneate at the base, and of a rich bright green colour; the stipes and rachis are black or purple. An ever-green species, which should have good shelter if planted in the open Fernery. It is admirably adapted for the Fern Case or Shade, and for bouquet making, and is a beautiful plant for growing on damp walls or rocks in the cool Fernery. It is a coast plant, being found in caves and fissures of rocks in Cornwall and Devon, in Wales, and various parts of Ireland.

A. Capillus-Veneris incisum.—A very distinct variety; size about the same as the preceding, but the pinnules are deeply slit down into narrow segments. Found in Ireland.

A. Capillus-Veneris incisum Footii.—This is a fine plant, with large and broad pinnæ, deeply incised; it grows upwards of a foot in height. I received specimens of this beautiful variety from Ireland in 1862, but am unable to say from what locality.

A. Capillus-Veneris rotundatum.—This form is somewhat variable. The pinnules are usually round, and have not the cuneate base of the normal form, neither are the

fronds so broad; like the former, it does well in the cool Fernery. Found in the Isle of Man.

ALLOSORUS.

This elegant little Fern is well known, and well deserving all the praise bestowed upon it, and no Fernery, however small, should be without it. It should be planted in a mixture of loam, peat, and sand, in about equal parts, with the addition of some broken sandstone, or else planted in crevices of the rock-work, if free from lime. This Fern delights in a cool, moist, and shady situation, and is admirably suited for the decoration of a Fern Case.

A. crispus (Mountain Parsley Fern).—A beautiful hardy plant, which should be generally grown. Fronds bright light green in colour, produced from a short, tufted, scaly caudex, and from six to twelve inches or more in height, somewhat triangular in form, tripinnate; the sterile fronds leafy, and presenting the appearance of parsley; the fertile ones about the same size, and contracted; the margins of the fronds involute, in the form of the indusium of *Pteris*, to which genus it has been erroneously referred. The plant is, however, more nearly allied to *Polypodium* than *Pteris*. A very handsome species, thriving well in a shady place in the open Fernery, and the fronds are charming additions to a bouquet. Found in the West of England, North Wales, and Highlands of Scotland. I have gathered splendid masses of this plant in an old quarry in Perthshire.

ASPLENIUM.

The British representatives of this family are all evergreen, but their requirements are various. *A. marinum*

and its several forms does not—save in a few places nearly level with the sea—thrive in the open Fernery, but makes a highly ornamental plant in a Wardian Case or temperate Fern house. The same may be said of *A. lanceolatum* and its varieties. *A. septentrionale* and *A. germanicum* should be planted in crevices of sandstone, with a little loam and sand to fix them. For the other species, a mixture composed of fibrous peat and sand, a good portion of broken sandstone, and a little loam is the best that can be used, taking care to elevate the crowns of the plants a little above the level of the soil. Although we have only nine species in this genus, there are upwards of one hundred and fifty named and recorded varieties, many of which are very beautiful plants for the Fern Case.

A. Adiantum-nigrum (Black Maiden-hair Spleenwort).—This fine and handsome plant is thoroughly hardy, and very ornamental in the rock-work; it is also well adapted for Fern Cases. The fronds rise from a short stout tufted scaly caudex, and are from six to eighteen inches high, bitripinnate, ovate in form, coriaceous, and dark green in colour; stipes and rachis dark brown or black, scaly at the base. It is widely scattered throughout the three kingdoms.

A. Adiantum-nigrum acutum.—A very distinct kind, and a most desirable plant. The fronds are about a foot or more long, deltoid and tripinnate; the pinnules narrow, and divided into acute linear-lanceolate lobes. A very elegant plant, and a capital one for cutting for bouquets. From Ireland.

A. Adiantum-nigrum fissum.—This is a somewhat depauperated form. The fronds are irregularly laciniate, and somewhat caudate. Originally found in Devonshire.

A. Adiantum-nigrum oblongum.—Very distinct, on account of its regular outline. The fronds are oblong; pinnæ and all the parts reduced in size from the type. From the Channel Islands.

A. Adiantum-nigrum obtusum.—A dwarf-growing plant. The fronds are about five or six inches high, sometimes not so much, bi or tripinnate, ovate in form; pinnules very obtuse, and but slightly toothed. Found in various parts of the country.

A. Adiantum-nigrum oxyphyllum.—This is a dwarf and very distinct form, with ovate-lanceolate fronds, resembling somewhat a minute form of *acutum*, though the shape of the frond is different; the teeth are very narrow and acute. A scarce plant, found in Argyleshire.

A. Adiantum-nigrum variegatum.—A handsome and rare variety, being unsymmetrically streaked and blotched with white, differing from the discoloration this species is subject to from attacks of insects. It is seldom found in a wild state.

A. fontanum (Smooth Rock Spleenwort).—This most beautiful species is very rare in a wild state; indeed, some of our best authorities seem to doubt if it is really indigenous. However, since it is recorded in 1775 as being gathered wild in Buckinghamshire and Cumberland, I think it must be accepted as a native species. The fronds are bipinnate, linear-lanceolate, the margins dentate, about four inches high, rich dark green in colour, and produced from an erect scaly caudex; pinnules small and somewhat cuneate. A most desirable plant, and a perfect gem for the Wardian Case.

A. germanicum (Alternate-leaved Spleenwort).—An extremely rare dwarf-growing and handsome plant. It is recorded as having been found at various places in Wales,

Scotland, and the North of England, but it certainly must be considered one of the rarest of our native Ferns. The fronds are pinnate or sub-bipinnate, the pinnæ alternate and linear; they are produced from a tufted caudex, and are from four to five inches long, of a dark green colour. An evergreen plant, perfectly hardy, but rather difficult to cultivate. It is well adapted for planting in the Wardian Case.

A. germanicum acutidentatum.—This variety is very distinct; the segments are sharply dentate, and the fronds do not grow so strong as the preceding, being seldom more than two or three inches in length.

A. lanceolatum (Lanceolate Spleenwort).—A highly ornamental species, admirably adapted for the decoration of the Fern Case. The fronds are bipinnate, lanceolate, brilliant shining green in colour, and from six to fifteen inches high; sori brown and copious. It has been found in various places in England, mostly in the West, in Wales, the Channel Islands, and Ireland; various forms of this I have seen growing in Dorsetshire.

A. lanceolatum crispatum.—This pretty and distinct variety is still rare in collections. The fronds are medium sized, rather broader than the type, and the margins are involute, and very much toothed. A very desirable plant, found in the Channel Islands.

A. lanceolatum microdon.—This beautiful form is so thoroughly distinct that one would scarcely think it was a variety only; it thrives well, and is very ornamental in the Fern Case, or when planted out in the rock-work of the cool house. The fronds are membranaceous; pinnæ somewhat obtusely lobed and undulate, the margins dentate. A handsome form, whether species or variety, which should be in every collection.

A. marinum (Sea Splcenwort).—As its name implies, this is a coast plant, being rarely found inland or much above the sea level. On this account it is rarely seen in good condition in the open Fernery; it is, however, one of our handsomest species when grown in a pot, or planted out in the rock-work of the temperate house, or in the Fern Case, its brilliant shining green durable fronds, and conspicuous dark brown sori, rendering it always a thing of beauty. Tho fronds are pinnate, linear-lanceolate, tapering to the point; pinnae somewhat oblong-ovate, more or less toothed on the edges, and thick in texture; length of frond usually from nine to twelve inches, often less, and sometimes much more; stipes purplish black, and winged. It is found plentifully round the Irish coast, also on the Welsh and South-West of England, on the Eastern coast of Scotland, in the Isle of Orkney and the Hebrides, and the Channel Islands.

A. marinum crenatum.—This variety is very distinct. The fronds are about six inches long; pinnae obtuse, and somewhat trapezoid, deeply and evenly crenate round the edges.

A. marinum ramosum.—In this form the fronds are forked below the commencement of the pinnae, which are obtusely dentate and undulate, slightly lobed, the lower pair, on both margins. It has been found in Devon and Dorsetshire.

A. marinum subbipinnatum.—This form is very much divided; in size it resembles tho species, but tho pinnae are laxly set on the stipes, and deeply lobed throughout, becoming in some instances almost bipinnate. It was first discovered in tho Channel Islands.

A. refractum (Reflexed Splcenwort).—This beautiful Fern came into my hands some years ago under the name

of *A. viride*, and was said to have been found in Scotland; but, upon sending it to Mr. T. Moore, he at once confirmed the opinion I had formed, that it bore no relationship to that species. The fronds are from five to eight inches long, dark green in colour, and proliferous, linear, pinnate; pinnæ short and oblong-obtuse, refracted, pinnatifid above, pinnate below. It is called by some *A. fontanum proliferum*. It forms a lovely object in a Wardian Case, or in the temperate house.

A. Ruta-muraria (Wall Rue Splecnwort).—This dwarf-growing species is widely distributed over the three kingdoms, forming, as I have seen it in Ireland, a lovely green covering to the walls; and if planted on a piece of sandstone in a Wardian Case it will have a very pretty effect. The fronds are about four inches long, bipinnate, triangular in shape; the pinnules cuneate, and dark heavy green in colour; sori brown and copious. It thrives well planted in the crevices of the rock-work in the open Fernery.

A. Ruta-muraria cristatum.—A handsome plant, retaining its peculiar form under cultivation. The fronds are from two to three inches high, with all the pinnules and apex of each frond tasselled or crested. It has been found in Kent and Surrey.

A. Ruta-muraria dissectum.—This rare and beautiful form is a charming little plant for the Wardian Case; the pinnules are very long and deeply cut. I have found this in Ireland, and it has also been found in Devon.

A. septentrionale (Forked Spleenwort).—A very distinct plant, but one somewhat difficult to establish in a Fernery. The fronds are from two to five or six inches in length,

divided into several linear alternate segments; smooth and bright dark green in colour. It is a somewhat rare species, occurring in various parts of Scotland. I have gathered it in Perthshire, and received specimens from Somersetshire. It is also found in Wales.

A. Trichomanes (Common Maiden-hair Spleenwort).—This very handsome and widely distributed species is well adapted either for the open air or a Fern Case; it is very hardy, and will make beautiful edgings to the walks of an out-door Fernery. The fronds are from three to ten or twelve inches long, linear, pinnate; pinnae somewhat ovate, cuneate at the base, and crenate on the margin; colour a rich dark green; stipes almost black. An abundant evergreen plant of great beauty.

A. Trichomanes bifurcum.—A very distinct plant, the fronds are some six inches high, the apex mostly double, sometimes even more divided; it is very suitable for a Wardian Case. I gathered this form in the County Kilkenny, Ireland, growing on the face of a wall; it has also been found in Kent.

A. Trichomanes cristatum.—This elegant plant should be in every collection. The fronds are about four inches high, the apex of each bearing a beautiful tassel or erect about an inch in diameter. It is of free growth, and reproduces itself true from spores.

A. Trichomanes Harrovii.—A very handsome somewhat prostrate form, with fronds from four to eight inches long, the pinnae broad, deeply lobed, and auriculate on the lower margin, the lobes deeply cut in some instances, so as to become bipinnate; it somewhat resembles the next variety, but is fertile.

A. Trichomanes incisum.—This is a remarkable and

handsome variety. I believe it has never been seen in a fertile state. The fronds are from four to six inches high, the pinnæ deeply pinnatifid, with narrow serrate and deeply cut lobes. It has been found in Yorkshire, Lancashire, and Devon, but is very rare.

A. Trichomanes lobatum.—A fine strong-growing form, producing fronds nine or ten inches high, and remarkable for having many of the pinnæ about the middle deeply cut into several obovate lobes. It is not always persistent; found in Devonshire.

A. Trichomanes multifidum.—This is a thoroughly distinct form; the fronds are about four or five inches high, and two or three times branched, each branch ending in a little crest; it thrives well either in the open Fernery or a Glass Case. Found in Scotland.

A. Trichomanes ramosum.—A very pretty variety, growing some eight inches high. The fronds are much branched, each branch becoming again divided, or more; the pinnæ deeply crenate. It is a very constant form. Found in various parts of England, and in Ireland.

A. Trichomanes subaequale.—This pretty form has, I believe, only been found in a few localities. The pinnæ are attached in the centre, broad at the base, and overlap each other, becoming almost imbricate, and beautifully crenate.

A. viride (Green Spleenwort).—A handsome species, thriving well in a cool house and the Wardian Case, but does not stand out well in the southern parts of England. I have gathered fine masses of this plant in Perthshire, with fronds upwards of six inches long. It is an evergreen plant, with pinnate fronds, narrow, and somewhat lanceolate in shape; pinnæ obtusely ovate, cuneate at the base, and crenate on the margins, oppo-

sito on the lower part of the frond, and alternate on the upper; colour light cheerful green. It is found in various parts of the three kingdoms.

A. viride multifidum.—This is a very pretty but by no means an uncommon form, and I have frequently gathered it. The fronds are about four or five inches high, pinnæ somewhat distant, and the apex of the fronds more or less forked. It is apt to lose its character under cultivation.

ATHYRIUM.

This genus holds a place midway between *Asplenium* and *Lastrea*, and is considered by some of our leading authorities as only a section of the first named genus. The only British species is the Lady Fern, but this seems extremely variable, for upwards of three hundred and fifty varieties are named and described; and I have frequently remarked, when gathering examples of this plant on the Yorkshire hills, where it is very prevalent, that it is almost an impossibility to find the normal state, but any quantity of fantastic shapes can be found. The soil best suited for the Lady Fern, and its numerous varieties, is a mixture of equal parts loam, peat, and leaf mould, to which must be added a portion of sand; they must be supplied with an abundance of water during the growing season, but as all are deciduous, less will be required during the season of rest. The robust-growing forms are among the most graceful ornaments to our hardy Ferneries during the summer, when advantage should be taken of their profuse growth, by drying some fronds for the decoration of the dinner table and sitting-rooms during the dull winter months. Those kinds which are less robust in habit, are charming objects when grown in

the Wardian Case, and if planted in small pots and plunged in the Case, they can be removed during the time they are at rest, and their places filled with other plants.

A. Filix-fœmina (Lady Fern).—A lovely and distinct plant, easily distinguished from any other British species. This Fern has, with the single exception of *Scolopendrium vulgare*, produced more varieties than any other known species. The fronds are variable in size and shape, being usually about eighteen inches in height, but frequently reaching three feet, bipinnate or tripinnate, and lanceolate in shape; pinnules sessile and dentate; caudex stout, scaly, and tufted. It is of easy culture (but requiring an abundance of water), elegant and graceful in appearance, producing a charming effect when grouped in the hardy Fernery. This Fern is widely distributed over the three kingdoms.

A. Filix-fœmina acuminatum.—This dwarf form is very distinct and handsome; it grows about twelve inches high, the pinnæ densely set, each ending in a long tapering point. An elegant and desirable plant, originally found on Snowdon.

A. Filix-fœmina apiculatum.—A slender and distinct form, producing fronds from six to twelve inches in length, and about three in breadth. The pinnæ taper to a long point, the pinnules are small and obtuse, the margins serrate; apex of the frond furcate. It is of graceful habit, and should be generally grown, forming with its beautiful arched fronds a charming ornament to the hardy Fernery or Wardian Case. Found in Scotland.

A. Filix-fœmina Applebyanum.—An elegant form, with long, narrow, pinnate, arching, and pendant fronds,

spreading out at the apex into a large flat ramose crest; the pinnæ are short and obtuse. It is a very distinct and desirable variety.

A. Filix-fœmina apuœforme.—Fronds from ten to twenty inches long, somewhat ovate in shape; the ends of the pinnæ are slightly tasselled, and a larger crest occurs at the apex of the frond.

A. Filix-fœmina compositum.—A peculiar and distinct variety, attaining the height of twenty inches; the fronds on the same plant are very dissimilar, bearing the characters of *laciniatum*, *multifidum*, *depauperatum*, and several others. It appears to be constant in cultivation.

A. Filix-fœmina coronatum.—Fronds somewhat prostrate, from one to two inches wide; pinnæ forked at the ends and distant; the apex of the frond crowned with a dense crest some three or four inches in diameter, formed by the ramification of the branches into which it is split. A fine dwarf form, from eight to twelve inches high.

A. Filix-fœmina corymbiferum.—This fine variety is very handsome when planted out. I have seen it twenty inches high, and some eight inches or more broad; the apex of the frond is divided into a dense and handsome flabellate crest, several inches in width, and each pinnæ is forked and crested more or less. One of the earliest of the known sports, and well deserving a place in the Fernery.

A. Filix-fœmina crispum.—This is not unaptly called the Parsley Fern, the fronds, which are about six inches high, resembling very much a mass of densely-curled parsley, both in form and colour. It is well suited for a Wardian Case in summer, and seems to have been gathered by old collectors long before Ferns became fashionable.

A. Filix-fœmina decurrens.—A dwarf form, growing about eight inches high, fronds spreading about two inches wide; the pinnæ narrow and acuminate; pinnules distant and deeply incised, each one decurrent with the mid-rib. It is distinct and handsome.

A. Filix-fœmina diffissum.—This attains a height of twelve or eighteen inches. The fronds are lanceolate in shape, the pinnæ often irregularly lengthened out, and the pinnules deeply dentate.

A. Filix-fœmina dissectum.—A very pretty small-growing kind. Fronds about ten inches high, ovate, with unequal and irregular pinnæ and pinnules, the latter decurrent and deeply cut down. Originally found in Ireland.

A. Filix-fœmina Elworthii.—One of the very finest varieties of this protean plant. The fronds are as large as the normal state; the apex of each bears a dense crown or crest, nearly six inches in diameter; the apex of each pinnæ also bears a large crest, and many of the pinnules are forked or crested to some extent.

A. Filix-fœmina excurrents.—About twelve inches high. The fronds have a somewhat bristly appearance, through the veins at the ends of the pinnæ and pinnules protruding like hairs. A very curious and distinct plant.

A. Filix-fœmina Fieldiæ.—This beautiful form is from twelve to twenty inches in length. The fronds are very peculiar, sometimes having a pair or so of pinnæ at the base nearly normal, others forked, trilobate, or cruciate. It is a most desirable plant, one that no collection should be without.

A. Filix-fœmina Friselliæ.—An extraordinary and handsome plant. The fronds are somewhat arched and pendulous, from ten to twenty inches long, and seldom more than one in width; pinnæ alternate, flabellate, and over-

lapping each other in pairs, which are dentate on the margins, and deep green in colour. I have seen this plant produce nearly normal pinnæ towards the centre or apex of the frond, which, however, only adds to its grotesque appearance. It is admirably adapted for suspending in a Basket during the summer months.

A. Filix-fœmina glomeratum.—This elegant variety produces fronds about twelve inches long, and four wide; pinnæ terminating in a dense crest, the lobes dentate on the margins; the apex of the frond is also crowned with a multifid head.

A. Filix-fœmina grandiceps.—A very handsome form, producing lanceolate fronds about twelve inches high, much branched, and forming dense globose crests. This plant should be in every collection.

A. Filix-fœmina Grantiæ.—The fronds of this fine variety attain the height of ten or twelve inches; the pinnæ are very dense and overlap each other; the points of the pinnules turn up, giving the plant a bristly appearance. It should be in every collection.

A. Filix-fœmina marinum.—This distinct form is remarkable for its very prostrate habit; fronds narrow, slightly tapering, and acuminate at the apex; pinnules dense and overlapping each other. It grows from ten to fifteen inches high.

A. Filix-fœmina minimum.—Fronds about six inches in length and one in breadth, lanceolate in shape; pinnules somewhat crispate and imbricate. This makes a very pretty specimen in the Fern Case in summer.

A. Filix-fœmina Moorei.—A very pretty variety for a Wardian Case or the temperate Fern house. The fronds are six or eight inches long, and narrow; pinnæ forked or crested; the apex of the frond spreading out into

a beautiful curled crest, three or four inches across. It was originally found in the Channel Islands.

A. Filix-fœmina multiceps.—An extremely beautiful variety, attains the height of twelve or eighteen inches; the pinnæ are all crested at the points, and the apex of the frond bears a large flat tasselled head, wider than the frond itself.

A. Filix-fœmina multifidum.—This very handsome and highly ornamental plant is as vigorous in growth as the species, though the pinnæ are somewhat narrower, bearing on the ends beautiful little crests, and the apex of the frond is crowned with a large crest beautifully tasselled. It should be in every collection.

A. Filix-fœmina multifidum nanum.—A form resembling the preceding, but is more densely crested, and seldom exceeds twelve inches in height. A very handsome and desirable plant.

A. Filix-fœmina pannosum.—This extremely elegant plant grows from twelve to twenty inches high, and is about six in width at the broadest part. The fronds are lanceolate; pinnæ acuminate; pinnules deeply and irregularly lobed. A very handsome finely-divided variety, often tinged with reddish purple.

A. Filix-fœmina Parsonsiæ.—A very distinct and handsome form, producing fronds from ten to eighteen inches in length, and six or seven in width, and broadly ovate in shape; the pinnæ are three or four inches long in the centre of the frond, and distant; the pinnules are also widely set, and serrate on the margins. Found originally in Hertfordshire.

A. Filix-fœmina plumosum.—A very handsome and ornamental variety. The fronds are tripinnate, and broadly lanceolate, sub-membranaceous in texture, and very finely

divided, giving the frond the appearance of a beautiful nodding feather. It grows from twelve to thirty inches high, and is nearly twelve in breadth. A superb variety, which should be in every collection.

A. Filix-fœmina Pritchardii.—This variety has somewhat the appearance of *A. Friselliæ*; though very distinct, the fronds do not terminate so abruptly as in that form, but are somewhat tapering, and gracefully curved; the pinnæ are decussate, and about half an inch in width. It attains the length of two or more feet, and is a very desirable plant.

A. Filix-fœmina thyssanotum.—Fronds about eighteen inches high, and six wide, bearing on the apex a eris-pate crest or tassel, and the points of the pinnæ ramose. An interesting and pretty variety.

A. Filix-fœmina thyssanotum minus.—A beautiful form of the preceding, which I have never seen exceed nine inches in height; it is more often four or five only. This is a charming little plant for a Wardian Case.

A. Filix-fœmina Victorice.—The most lovely of all the forms of this species. The ends of the fronds and pinnæ are elegantly tasselled; the pinnæ are all forked near the base, each branch diverging and crossing a branch of the next pinnæ, giving the whole plant a beautiful and extraordinary appearance. Found in Scotland.

BLECHNUM.

Of this genus we have only one representative in Britain; that, however, has produced nearly a hundred varieties, some of which are extremely handsome, and the majority well worth cultivating in the hardy Fernery. It is an evergreen Fern, stands exposure well, and thrives in almost any soil, if free from lime. In habit

and appearance it is thoroughly distinct from every other indigenous Fern, the rich dark green colour of its fronds and firm texture, together with its easy culture, rendering it a general favourite with the grower of British Ferns.

B. Spicant (Hard Fern).—This species is easily cultivated, and is very ornamental in the out-door Fernery, its dark green fronds contrasting well with such as the varieties of the Lady Fern. The sterile fronds grow from twelve to eighteen inches in length, and are somewhat prostrate and pinnatifid; the fertile from twelve to twenty-four inches in height, erect, rising from the centre of the crown, contracted, pinnate below, and pinnatifid above. It is widely distributed over the three kingdoms.

B. Spicant anomalum.—The fronds of this variety are about nine inches in height, thin in texture, and much attenuated; the pinnæ are all partially fertile, without being so much contracted as usual. A novel and desirable plant.

B. Spicant anomalum minus.—A miniature of the preceding variety, seldom exceeding four or five inches in height, and makes a charming little plant in a Wardian Case, on account of its very dwarf habit. It was originally found in Wales.

B. Spicant concinnum.—This is an extremely pretty variety. The barren fronds are prostrate, about a foot in length, and half an inch in breadth; the lobes almost flabellate, beautifully crenulate round the margins, and somewhat imbricate; the fertile fronds are similar in outline, but erect.

B. Spicant contractum.—A charming plant for the Wardian Case. The fronds are from four to six inches

long, and very narrow; the lower portion resembles a deeply incised wing to the rachis, the upper portion pinatifid, becoming again narrow at the apex. It should be in every collection. Found originally in North Wales.

B. Spicant crispum.—A handsome form, having the lobes of the fronds beautifully undulated or curled, and nearly always entire, and the apices all crested. Admirably adapted for a Wardian Case.

B. Spicant cristatum.—Fronds normal in shape, but less in size, seldom exceeding nine inches in height; its principal difference is in the furcate crested apex of each frond. It is a pretty plant in the Glass Case. Found at Tunbridge Wells and several other places.

B. Spicant flabellatum.—This remarkable and extremely handsome variety is robust in habit; the fronds are several times divided near the base, each division being beautifully ramose, and crested at the apex. It is a very rare form, and a most desirable one for every Fernery or Fern Case.

B. Spicant imbricato-erectum.—A distinct form of the preceding; the fronds are ligulate in shape, the pinnæ are imbricate, and in the fertile fronds turn back so that their edges almost meet. A very pretty and desirable plant.

B. Spicant imbricatum.—This is a beautiful variety for the Fern Case. The sterile fronds are about six inches long and two wide, ovate-lanceolate in shape, and thick in texture, the obtuse lobes being densely imbricate; in the fertile fronds, which grow erect from the centre of the crown, the lobes are somewhat narrower. This should be grown in every Fernery.

B. Spicant lancifolium.—A singular variation, when fertile resembling somewhat *Doodia caudata*. The sterile

fronds are narrow, depauperated at the base, and entire and ligulate towards the apex; the fertile about nine inches long, pinnatifid; pinnæ short and obtuse, the terminal one very much elongated. It has been found in various parts of the country.

B. Spicant multifurcatum.—Fronds from five to ten inches in height, and nearly two in width, the apex divided into several branches, forming a head upwards of three inches across, the pinnæ are also usually furcate; sterile fronds prostrate, fertile erect. A most desirable and handsome variety.

B. Spicant polydactylon.—A very handsome form, which grows nearly as large as the species, and bears a beautiful crest upon the apex of every frond. A highly ornamental and interesting plant, well suited for the Wardian Case.

B. Spicant serratum rigidum.—The fronds of this variety are nine or ten inches in height, pinnate, and crested upon the ends; pinnæ distant, and serrated on both margins; very rigid and erect in habit. It is a distinct and handsome plant.

B. spicant serrulatum.—A little gem for a Fern Case. The fronds are about six inches high, lanceolate in shape, and very narrow; pinnæ short, and beautifully serrulate on the margins. This charming variety should find a place in every collection.

B. Spicant strictum.—This distinct plant is about twelve inches in height, and one inch in width; the lobes dentate, often slightly depauperated; the fertile fronds are much narrower than the sterile. It has been found in various places in the North of England.

B. Spicant variabile.—An interesting and curious form. The fronds are four or five inches long, simple, and entire, for a third of their length enlarging upwards,

and then suddenly contracting; the apex sometimes furcate.

BOTRYCHIUM.

The plants belonging to this genus are not considered true Ferns; they differ in their mode of growth, which is straight, and not rolled up or eireinate, as with the Ferns. The fronds are produced from an underground root, and are annual, making their appearance about April, and dying away in June and July. It is difficult to grow this plant in a pot, but if planted in a good depth of well-drained sandy loam, either in the open Fernery or the temperate house, it will thrive well. Though a somewhat extensive genus, we have only one native species, of which a few varieties are recorded.

B. Lunaria (Common Moonwort).—The fronds of this pretty species vary from four to eight or ten inches in height, erect, and dividing into two segments; the sterile pinnate, glabrous, and glaucous green in colour; pinnæ lunulate, the margins being in some specimens entire, in others slightly crenate, usually about six pairs on each branch; the fertile bipinnate, contracted, and forming little sporangiferous spikelets. The fronds are annual. It is widely distributed, and is a very pretty and interesting plant.

CETERACH.

We have only one species to represent this genus in Britain, but it is at once distinct and very handsome. It is abundantly distributed throughout the kingdom, but nowhere have I seen it in such luxuriance as in various parts of Ireland, where it is to be seen completely covering the stone walls. I have gathered several distinct and very pretty forms in some of these

places, but they have not proved constant under cultivation. To succeed in growing this plant well, it must be planted in a crevice of a large lump of limestone, or have plenty of broken limestone mixed with a little peat.

C. officinarum (Scaly Spleenwort).—This is a distinct little Fern, and when seen as it grows in various parts of Ireland clothing the stone walls, it is really a charming object. The fronds are pinnatifid, often pinnate towards the base, and rise from a scaly tufted caudex, to the height of six and eight inches, but are more often seen in cultivation about half that size; they are leathery, smooth, and dark green above, densely clothed below with brown imbricated squamose scales. It is very abundant in Ireland, also common in England and Wales, but occurs less frequently in Scotland.

C. officinarum crenatum.—This form is very robust; it differs by having the margins of the lobes deeply crenate. I have gathered this in the South of Ireland at two different places, both in situations where the species was very plentiful and luxuriant.

CYSTOPTERIS.

A genus of pretty deciduous Ferns, all beautiful objects for the decoration of the Wardian Case in summer, but if grown for this purpose it should be in pots, in order that they may be removed in winter when the fronds have decayed. For the out-door Fernery this family are also very ornamental, if a moist shady place is selected for their reception. The soil best adapted for the culture of these plants is a mixture, in equal parts, of loam, fibrous peat, leaf mould, and sand, with the addition of some pieces of limestone, special care being taken that the drainage is perfect.

C. fragilis (Brittle Bladder Fern).—This very elegant species is admirably adapted for the Fern Case, and also the open Fernery, if planted in suitable places. The fronds are from six to twelve or more inches high, bipinnate, oblong-lanceolate in shape; pinnæ and pinnales ovate and dentate, dark green in colour, and deciduous.

C. fragilis angustata.—This is not so robust a grower, seldom exceeding nine inches in height, and differs in the whole frond being attenuated, in some instances depauperated. It succeeds well in the Wardian Case in summer.

C. fragilis dentata.—A pretty dwarf variety. The fronds are about six inches in height, bipinnate, bluntly toothed, and the sori very close to the margin; dark green in colour. It thrives well in a Fern Case.

C. fragilis Dickiana.—A most elegant variety, and one that no Fernery or Wardian Case should be without. The fronds are four or five inches in height, and rich dark green in colour, the pinnæ all bend down somewhat, and overlap each other, and the pinnales are slightly and bluntly toothed.

C. montana (Mountain Bladder Fern).—This very handsome Fern is readily distinguished from the other species by the distinct shape of the fronds, which are triangular in shape, and produced from a long creeping rhizome, from six to ten inches in height, and tripinnate; pinnales ovate and pinnatifid, colour a dark green; stipes and rachis dark brown and scaly at the base. It is by no means a plentiful species in Britain.

C. regia (Alpine Bladder Fern).—In this species the fronds are about four inches in height, sometimes more, lanceolate in shape, and bipinnate; pinnæ and pinnales

ovate, the lobes dentate. It thrives well in the open Fernery and in a Wardian Case during summer, forming a charming little specimen.

GYMNOGRAMMA.

Only one species of this genus claims rank as a British Fern, and the only locality recorded is the Island of Jersey. It is, moreover, a singular and interesting species, on account of its being one of the very few known Ferns of but annual duration. For its successful management it should be planted in a compost, consisting of two parts loam, and one each of peat and sand. It requires an abundant supply of water, and must have thorough drainage. If grown in the open Fernery the spores will spring up spontaneously, but some should be gathered for the ensuing season's supply. For the Wardian Case also it makes an elegant summer plant.

G. leptophylla (Small-leaved Gymnogram).—A very pretty little plant, and one that makes an interesting specimen when cultivated in the Fern Case. The fronds are somewhat oval in form, bitripinnate, the pinnules cuneate and bluntly lobed, membranaceous in texture, smooth and pale green in colour. The only locality that this delicate species has been found in is Jersey. It is, however, scattered over Europe, Asia, Africa, and America, and is also found in Australia.

HYMENOPHYLLUM.

For the management of these plants, see the chapter on Filmy Ferns, page 19. The soil best adapted for them is fibrous peat, sphagnum moss, and a little sand, with an addition of some pieces of sandstone. They

make elegant objects in a Fern Glass by themselves, and will also thrive in a Wardian Case with some other Ferns, but they do not succeed well in the open Fernery.

H. tunbridgense (Tunbridge Filmy Fern).—This elegant plant should be in every Fern Case and cool Fernery. I have seen it in many parts of Ireland in great profusion, forming splendid objects, which may easily be imitated if the directions given are attended to. The fronds are produced from slender wiry creeping rhizomes, membranaceous, about four inches in length, and dark rich green in colour, ovate-lanceolate in shape, and pinnate; pinnæ pinnatifid, divided into linear segments, which are dentate on the margins. An evergreen species, which deserves general cultivation.

H. unilaterale (Wilson's Filmy Fern).—The present species is often called *H. Wilsoni*, but the above name has priority. It is widely distributed, and I have found it in great abundance and luxuriance in several parts of Scotland, in company with the preceding. The fronds are membranaceous, oblong, and pinnate, the pinnæ pinnatifid, and rich green in colour, more conspicuously dentate on the margins than the preceding species. The best and readiest method of distinguishing them from each other is by the form of the involucre; in the preceding they are sessile and serrate on the margins; in the present plant the involucre is stipitate and smooth on the margins. The fronds of this plant, like many of the exotic Filmy Ferns, continue for several years, and extend their growth annually.

LASTREA.

Many of the plants included in this genus are of robust habit and noble appearance. They are distinguished by

free forked veins, and a reniform indusium. The same soil will suit the whole, varying it a little according to the vigour of the particular plant; thus, if robust, a mixture of loam, peat, and sand in equal proportions is the best that can be used, but if delicate, less loam should be given, and some pieces of sandstone mixed in with it; good drainage is essential, and a liberal, but not excessive, supply of water to the roots. Most of the species are deciduous, but with protection the majority retain their fronds through the winter. We have nine species belonging to this genus, and the number of named variations of these is about two hundred and fifty, of which *Filix-mas* contributes fully one half; many of them are exquisitely beautiful, and add considerably to the attractions of the hardy Fernery and Wardian Case, for which the dwarfer-growing kinds are admirably adapted.

L. acmula (Hay-scented Buckler Fern).—This very handsome evergreen species should be in every collection. It produces fronds from a stout tufted caudex, from twelve to twenty inches high, and about eight in breadth, triangular in shape, tripinnate, the pinnules lobed, sharply toothed, and rich bright green in colour. The grateful odour yielded by this plant lasts for a long time in the dried specimens. It is plentiful in Ireland, the West of England, and in Wales.

L. cristata (Crested Buckler Fern).—A very ornamental deciduous species for the hardy Fernery. The narrow erect fronds are produced from a stout creeping rhizome, and vary from one to two, or more, feet in height, bipinnate, somewhat oblong in shape; pinnæ deltoid, lobes of the pinnules obtuse and crenate, and light green in colour; stipes clothed with a few large obtuse light brown chaffy scales. It is found in Norfolk, Suffolk, North-

amptonshire, and a few other places, but is not generally distributed.

L. cristata uliginosa.—This plant varies considerably in the shape of the fronds, the sterile ones produced early in the season resemble the preceding species. The fertile fronds are linear-lanceolate in shape, bipinnate, and all the pinnæ stalked, so that they more nearly resemble *L. spinulosa*; indeed, this plant is intermediate between *cristata* and *spinulosa*, the three forming a group with a ereeping caudex and broad pallid scales, quite distinct from *L. dilatata*, with which *L. spinulosa* is sometimes confounded.

L. dilatata (Broad Priekly-toothed Buckler Fern).—A well-known and common species, widely distributed throughout the three kingdoms. The fronds are ovate in shape, bipinnate; the pinnules pinnatifid and serrate on the margins, from two to four feet high, and dark green in colour; caudex stout and erect, stipes scaly throughout their entire length, but at the base densely clothed with large dark brown chaffy scales, which are margined with a lighter colour.

L. dilatata angustipinnula.—A distinct and pretty form, producing fronds about twenty inches high, and nine wide; the pinnæ are somewhat distant, and the pinnules are very irregular; lobes of the pinnules dentate.

L. dilatata Chanteriac.—This variety produces bipinnate lanceolate fronds from one to two feet in height, and about eight or nine inches in width, diminishing towards the apex, pinnæ distant, and the pinnules very obtuse and dentate; the stipes clothed with broad brown chaffy scales, darker in the centre, and mucronate at the apex. A distinct variety, found in Devonshire.

L. dilatata dumetorum.—Fronds ovate or triangular,

seldom exceeding twelve inches in height, more often much less, and frequently fertile when but two or three inches high; the fronds have a peculiar undulating surface. It is a very pretty and desirable plant, well suited for the Fern Case. It produces fertile fronds when very young.

L. dilatata lepidota.—A distinct variety, producing fronds from six to twelve inches in height, broadly ovate, and quadripinnate at the base. The whole frond is finely incised, giving the plant a very elegant appearance. It is said to have been found in Scotland.

L. dilatata Stansfieldii.—This is a beautiful variety, well worthy general cultivation; fronds six to twelve inches long, and about four broad, ovate-lanceolate in shape; pinnæ obtuse; pinnules deeply serrated on the margins, and curled. A handsome plant for the Wardian Case or hardy Fernery.

L. Filix-mas (Male Fern).—This ornamental species is one of the most universally distributed of all our native Ferns. The fronds are broadly lanceolate in shape, and sub-bipinnate; pinnules obtuse, serrate on the margins, and dark rich green in colour; caudex stout and tufted; stipes densely clothed with long chaffy light brown scales.

L. Filix-mas abbreviata cristata.—A charming miniature form of *L. Filix-mas cristata*, though the pinnæ are not so densely crested. It grows from ten to eighteen inches high; pinnæ distant and crested; apex of the fronds furcate. It is a very desirable variety.

L. Filix-mas acrocladon.—This very elegant and distinct form produces fronds some twenty inches or more in length, ovate-lanceolate in shape, and deep rich green in colour; the apex of each pinnæ, as well as the top of the frond, is profusely crested; pinnules deeply toothed. A fine ornamental variety.

L. Filix-mas Bollandiæ.—A very handsome and distinct form. The fronds vary from twelve to twenty inches in height, and some eight or nine wide, and are thin in texture; the pinnæ are remarkable for their width, and undulate appearance. I believe hitherto this variety has not been seen in a fertile state. A very ornamental variety for the out-door Fernery. Originally found in Kent.

L. Filix-mas crispa.—A very desirable variety, and one that thrives well in a Wardian Case. The fronds are about nine inches in length, ovate-lanceolate in shape; pinnæ and pinnules crowded and imbricate. A most distinct and handsome plant.

L. Filix-mas cristata.—No hardy Fernery should be without this grand variety. The fronds are usually about two feet high, and ten inches broad; it often grows to a much greater height, however, with good cultivation; the pinnæ are shorter and narrower than the species; the apex of the frond and each pinnæ is beautifully tasselled or erected; fronds gracefully arched, and dark green in colour. It was first found in the West of England.

L. Filix-mas cristata angustata.—This very handsome variety is an exact counterpart of the preceding, but the fronds are only about two or two and a half inches in width. It is an elegant plant, and should be in every Fern collection.

L. Filix-mas furcans.—A fine robust form, producing fronds upwards of thirty inches in height, with the apex of each pinnæ forked, the forkings usually very broad. It is a desirable and bold-looking plant.

L. Filix-mas grandiceps.—Fronds normal in length and breadth, but the apex is densely ramose and erected; the pinnæ the same, but in a less degree, and the pinnules also are frequently furcate. It is one of the

finest ornamental varieties of this species I have ever seen, and is well deserving general cultivation.

L. Filix-mas Pinderi.—Fronds between two and three feet high, about four inches wide in the broadest part, linear-lanceolate in shape, and erect. A variety well marked, on account of its narrow outline.

L. Filix-mas polydactyla.—This handsome and graceful form produces fronds one, and sometimes even two, feet in height; the pinnæ are about the normal width, but sharply tapering towards the apex, which, as well as the top of the frond, is terminated by a beautiful tuft or crest.

L. Filix-mas pumila.—An elegant little variety, very handsome when used as an edging to walks in the hardy Fernery. The fronds are rich dark green in colour; the pinnæ pinnatifid and obtuse. It forms a pretty ornament in a Fern Case.

L. Filix-mas Scholfieldii.—A charming little variety for a Fern Case. I have received this form from Scotland, but it is very rare. It seldom exceeds four inches in height, and half an inch in breadth; the fronds are pinnate; pinnæ elliptical, and obtusely dentate on the margins; apex of fronds forked or crested. This deserves general cultivation.

L. montana (Mountain Buckler Fern).—A beautiful and distinct species, producing fronds from a decumbent rhizome; they are one to two feet in height, and three to six in breadth, lanceolate in shape, and gracefully arched, pinnate; the pinnæ linear-lanceolate and pinnatifid, light green in colour, and yielding an agreeable perfume; stipes clothed with numerous light brown chaffy scales.

L. montana cristata.—This is a very rare and beautiful variety. The fronds are nearly as large as in the species,

with the apex of the frond beautifully tasselled or crested, and the point of each pinnæ furnished in like manner, but in a less degree, this, together with its fragrance, constituting it one of the finest of our British varieties.

L. montana Nowelliana.—This variety is so thoroughly distinct, that little trace of the species is left. The fronds are from twelve to eighteen inches in height, and four or five in width, pinnate, with narrow pinnæ, lobes much abbreviated and erose. It is a fine plant, worthy a place in every collection.

L. montana truncata.—An extremely curious form, which is also very rare. It differs only from the normal state in having premorse pinnæ—that is, the ends all look as if bitten off, and the mid-rib only remaining.

L. remota (Remote Buckler Fern).—A handsome species, which was discovered a few years ago in Westmoreland, for the first time in this country. The fronds are from one to three feet in height, and ten inches in breadth, somewhat lanceolate in form, tripinnate; the pinnæ rather distant towards the base; stipes from nine to twelve inches long, and clothed with large chaffy scales. A most desirable deciduous kind.

L. rigida (Rigid Buckler Fern).—This beautiful species is far from common—indeed, it may be considered one of our rarest British Ferns. The fronds are bipinnate, and somewhat lanceolate in form; pinnæ acuminate; the pinules obtusely lobed and dentate, dark green in colour, and about twenty inches in height, they are produced from a stout scaly tufted decumbent caudex; stipes densely clothed with large bright brown chaffy scales. It is a very handsome plant, and one which no hardy Fernery should lack.

L. spinulosa (Narrow Prickly-toothed Buckler Fern).

—This is a common species, producing fronds from a decumbent rhizome, light green in colour, and which vary in height from two to four or more feet; they are bipinnate, and somewhat lanceolate in shape; pinnæ stalked, distant, and triangular in shape; the pinnules oblong, lobed, and deeply serrate on the margins; stipes with a few large light coloured chaffy scales laxly scattered near the base. This species somewhat resembles, and is often mistaken for, *L. dilatata*, but may always be distinguished by the creeping pale scaly caudex. It is generally distributed throughout the country, and grows luxuriantly in the out-door Fernery.

L. Thelypteris (Marsh Fern).—The fronds of this species sometimes attain the height of three or four feet, but are more frequently to be seen from one to two; they are produced from a slender creeping rhizome, and are pinnate, and broadly lanceolate in shape; pinnæ deeply pinnatifid, linear-lanceolate, and soft light green in colour. This thoroughly distinct species should find a place in every Fernery.

LYCOPODIUM.

The British Club Mosses, though not belonging to the Filices, are generally associated with them. They are very pretty and distinct plants, though seldom seen in cultivation—indeed, they are not well suited for the out-door Fernery, but are admirably adapted for a Wardian Case, in which their beauties are well developed if planted in good spongy peat and sphagnum moss, and well shaded from the sun.

L. alpinum (Savin-leaved Club Moss).—An evergreen species, growing about four inches high, of a cheerful bright green colour, and producing masses of quad-

angular dichotomously branched stems, densely clothed with coriaceous lanceolate leaves; the fertile branches are erect, about half an inch long, swollen, and square upon the top. I have received beautiful examples of this plant from Snowdon; it is also abundant in Scotland and the North of England.

L. annotinum (Interrupted Club Moss).—This is a very distinct species, easily distinguished by the character which has given rise to its name, by the interruption of its leaves, showing distinctly its annual growths. The leaves are sessile, linear-lanceolate in shape, with serrate margins and mucronate points; the fertile spike is sessile, and about an inch in length. A rare plant, found with us only in the mountains of Scotland.

L. clavatum (Common Club Moss).—A species pretty generally distributed. It is procumbent in habit, producing stems of indefinite length, which root from the under surface. The leaves are lanceolate in shape, densely set upon the stems, and light green in colour; the fertile spikes are cylindrical, and produced upon upright stems about three inches long, sometimes singly, frequently in pairs, but seldom three together. A common plant, used in the country places for mats, brooms, and various domestic purposes. Found in England, Ireland, Scotland, and Wales.

L. inundatum (Marsh Club Moss).—This is a very pretty and interesting little plant. It is seldom to be found in a living state more than a few inches in length, on account of the basal portion continually decaying. The creeping stems are densely clothed with acute linear-lanceolate leaves; the spikes are produced upon upright stems, and are about two inches in height. It is plentiful in England.

L. Selaginoides (Prickly Club Moss).—This is a very pretty species ; the branches are short, decumbent, and branched ; the leaves are lanceolate in shape, and dentate on the margins ; the fruiting spikes are produced upon upright stems, and with the spike are about two inches in length. It is frequent in Ireland, and, though not so plentiful, is found in various parts of England, Scotland, and Wales.

L. Selago (Fir Club Moss).—Erect in habit, producing stems about six inches high, and dichotomously forked, densely clothed with acute lanceolate leaves, coriaceous in texture, and dark green in colour. The fructification is borne in the axils of the leaves near the apex of the branches. Found plentifully in Scotland and in the North of England.

OPHIOGLOSSUM.

This is another genus like *Botrychium*, not recognised scientifically as belonging to the true Ferns, but termed Pseudo-Ferns or Fern allies. To the cultivator this is a matter of little consequence ; they are similar in appearance, and require the same treatment. The plants included here require loam and sand. *O. vulgatum* enjoys the shade and protection of grasses, and such-like plants, and should be allowed to grow up in the Fernery amongst them.

O. lusitanicum (Dwarf Adder's Tongue).—This very interesting plant is found with us only in the Island of Guernsey, and is in perfection in mid-winter. It is abundantly distinct from the next species. The fronds are produced from an underground cormus, and attain the height of two inches, sometimes a little more, the sterile being simple, entire, linear, fleshy in texture, and light green in colour ; the fertile segment spike-like,

simple, and linear-oblong in shape. It is difficult to cultivate with any degree of certainty.

O. vulgatum (Common Adder's Tongue).—This species is so distinct in form and widely distributed that most lovers of plants are familiar with its appearance. The fronds are from six to ten inches in height; in the barren state simple, entire, broadly ovate, or ovate-lanceolate, light green in colour, and thick in texture; fertile segment erect and linear; stipes smooth and succulent, divided above into fertile and sterile branches. It is a common plant, being usually found in moist meadows, growing amongst and under the shelter of the surrounding vegetation.

OSMUNDA.

In the vicinity of water these plants make truly noble objects. The Royal or Flowering Fern, as this plant is called, is of easy culture; planted in spongy peat, and if allowed an abundant supply of water to the roots, it will grow vigorously, and soon make a dense mass. Several varieties of this species have been recorded, the best of which are given here. It is a deciduous plant.

O. regalis (Royal Fern).—This truly regal plant should find a place in every collection. The fronds are pale green in colour, and often six feet in height, sometimes as much as eight and nine; they are produced from a stout tufted caudex, and are bipinnate and ovate-lanceolate in shape; pinnules about an inch and a half or two inches long, oblong, sometimes slightly cared at the base; when fertile, some five or six pairs of pinnæ at the apex of the frond have the pinnules wholly contracted, and form sporangiferous panicles, presenting the appearance of flowers, which has given rise to the name of Flower-

ing Fern. A very handsome deciduous plant, requiring abundance of moisture during the growing season.

O. regalis cristata.—This splendid variety is equally as vigorous and robust in growth as the species, from which it differs in having the ends of the fronds and all the pinnæ profusely crested. It is a plant no Fernery should be without.

POLYPODIUM.

In this genus we have five species, and about a hundred recognised and named varieties, *P. vulgare* contributing by far the largest proportion. Many of the forms of this species are extremely beautiful, and as all retain their fronds during winter, they become well suited for the decoration of the Wardian Case or cool Fernery; they should be planted in good fibrous peat, with the rhizomes on the surface. The other four species are deciduous. *P. Dryopteris*, *Phegopteris*, *Robertianum*, and their varieties require a compost, consisting of fibrous peat and silver sand, with the addition of a few pieces of sandstone and a little loam, with perfect drainage. *P. alpestre* and *flexile* succeed best well drained, in a mixture of loam, peat, and leaf mould, and require an abundance of water during the growing season. The whole of our British Ferns belong to the order *Polypodiaceæ*, of which this genus is the type, and to which belong also the great majority of the Exotic species.

P. alpestre (Alpine Polypody).—This is a very distinct and pretty plant. The fronds are from ten to thirty inches in height, bi or tripinnate, lanceolate in shape, and somewhat erect in habit; pinnules ovate-lanceolate, and pinnatifid; the margins of the lobes serrate, colour dark green. It is a very handsome addition to our

hardy Ferneries, in general appearance closely resembling the Lady Fern (*Athyrium Filix-fœmina*), but, in the absence of indusium, is abundantly distinct from that plant, if no other difference were visible. The only localities in the United Kingdom this species has been found in are Perth and Aberdeenshires, and one or two other places in the Scottish highlands, where it is found in great plenty, and mostly in company with the Lady Fern.

P. alpestre flexile.—A very delicate form of the preceding, if, indeed, it be not specifically distinct. The fronds are from eight to eighteen inches in height, and two in width, bipinnate, linear-lanceolate in shape, and prostrate in habit; pinnæ deflexed; the pinnules distantly dentate; colour light green; stipes very short indeed. It requires dense shade and abundance of air to develop its beauties. At present it has only been found in a wild state on the Clova Mountains, Forfarshire, and in Inverness-shire.

P. Dryopteris (Oak Fern).—A deciduous species, well known and universally admired. The fronds are from six to twelve inches in height, ternate; the branches pinnate, the pinnæ deeply incised, and bright green in colour; they are produced from a slender creeping rhizome, and when only partially unfolded, the pinnæ on each branch are rolled up, resembling little balls. I have seen multifid and other varieties of this plant, but they are not constant in cultivation. It is a common species in the North of England and Scotland.

P. phegopteris (Beech Fern).—This elegant Fern is easily distinguished by the basal pair of pinnæ being suddenly deflexed, or refract, and by the hirsute appearance of the whole frond. It attains the height of

eighteen inches, and has a very slender creeping hairy rhizome; the fronds are pinnate, somewhat triangular in shape, and tapering to a long point; the pinnae sessile, obtusely lobed, and dark green in colour. A very handsome deciduous plant for growing in the crevices of the rock-work, and is tolerably plentiful in various parts of the United Kingdom.

P. Robertianum (Limestone Polypody).—A highly desirable species, producing fronds from six to fifteen inches in height, erect, subternate, tripinnate below and bipinnate above, the margins obtusely erenate, and dull green in colour; the stipes are produced from a slender creeping sealy rhizome. This pretty deciduous Fern should be in all collections, and to grow it satisfactorily, add to the soil a considerable quantity of broken limestone. It is not found in Ireland, and but rarely in Scotland.

P. vulgare (Common Polypody).—A species universally distributed throughout the United Kingdom. It and its varieties are of strong constitution, thriving in any spot in the open air Fernery, saving in extreme drought or moisture. It is an evergreen species, producing, from its stout creeping sealy rhizome, fronds some twelve or eighteen inches in height, deeply pinnatifid, and linear-oblong in shape, the pinnae oblong and obtuse, and dark green in colour. It produces a fine effect growing in a mass on the rock-work, either out-doors or in the temperate house.

P. vulgare auritum.—In general outline this form resembles the type, but it differs in being auriculate at the base of the pinnae, sometimes on the upper margin, sometimes the lower, and other times on both, or all three forms on one frond; fronds from ten to fifteen inches in

height, and upwards of two in width. Found in the North of England and in Wales.

P. vulgare bifidum.—This variety grows from ten to fifteen inches in height, and about three in breadth, differing from the normal state by having the lobes furcate, sometimes even bifurcate. It occurs pretty frequently at various places in the North of England.

P. vulgare cambricum.—Amongst the earliest known variations of *vulgare*, and still one of the most handsome and best. It differs very widely from the normal state by being very close and dense in habit. The fronds are from twelve to twenty inches high, and from four to six or eight in breadth, broadly ovate, and bipinnatifid; the pinnæ ovate-lanceolate; pinnules imbricate and serrate on the margins. It has always proved constant in cultivation, but has never been seen in a fertile state. First found in Wales, and named the Welsh Polypody; since in a few localities in England and Ireland.

P. vulgare compositum.—This plant combines the characters of several varieties in itself. The fronds are from twelve to eighteen inches high, and about four in breadth; some are furcate on the points of the pinnæ, others are part forked and part serrate, others are much enlarged, and sometimes eared. It is an interesting and curious variation. Found in the lake districts.

P. vulgare cristatum.—A handsome and very distinct form, producing fronds about fifteen inches high, and from three to four in width; the points of all the pinnæ crested and curled, the apex of the frond is bifid, each branch again forking, often becoming crested like the pinnæ. Found in Ireland.

P. vulgare marginatum.—This is a fine and distinct

variety, producing fronds about a foot in height, linear-lanceolate in shape, and the pinnæ unequally, sometimes deeply, serrate. It was originally found in the South of England.

P. vulgare multifido-cristatum.—Fronds from six to ten inches in length, three inches of which has only a narrow wing on each side of the stipes; they then divide, becoming again and again forked, and ultimately produce a dense, curled, multifid crest, some three inches across.

P. vulgare omnilacerum.—This form resembles *cambricum* in general appearance, but the first marked distinction is its being fertile. The fronds are pinnatifid; pinnæ deeply lobed, in the way of *cambricum*, but the lobes are not imbricate, as in that variety; the apex of each pinnæ is also more lengthened out. It is a rare and very handsome plant, originally discovered in Herefordshire.

P. vulgare pulcherrimum.—A really fine plant, and one that deserves to be in every collection. It produces fronds a foot or more in length, and about six inches in width, resembling *cambricum* in outline and divisions of the lobes, and in the imbricate pinnules. It is deeply serrate at the apex of the frond, thick and firm in texture, and abundantly fertile.

P. vulgare semilacerum.—Fronds from twelve to fifteen inches long, and five or six in width, deeply bipinnatifid below, becoming pinnate and fertile towards the apex; pinnæ irregularly dentate. A very distinct and handsome variety. Originally found in the Dargle Valley, County Wicklow, Ireland.

P. vulgare suprasoriferum.—This very peculiar form is nearly normal when barren, but in the fertile state the sori in many instances are produced at the margins on

the upper surface. Its fronds are somewhat narrow, and from ten to twelve inches long. Found only in the South of England, I believe, and there somewhat sparingly.

P. vulgare variegatum.—Very normal in general outline, but distinctly striped and spotted with yellowish white. I believe this is uncertain under cultivation; but as it is one of the few variegations our indigenous Ferns have assumed, it is worth recording, and is deserving a place in the Fernery, for when in character it is very pretty.

POLYSTICHUM.

The British examples of this genus form a small and distinct group of noble evergreen Ferns. There are only three indigenous species, but these have sported extensively, and we have upwards of three hundred and fifty named and distinct forms, *P. angulare* being the largest contributor. The robust-growing kinds should be potted in good loam and sand; the smaller and more delicate in constitution require the addition of a little peat, leaf mould, and some pieces of broken sandstone. All love the shade, and become more vigorous, and the dark green fronds are deeper and richer in colour, in such situations. They make splendid decorative plants in the hardy Fernery and Wardian Case. *P. Lonchites* requires a little extra care; it must be preserved from drip, and supplied with an abundance of drainage material.

P. aculeatum (Common Prickly Shield Fern).—A species considered by many as not distinct from *P. angulare*, but this is a conclusion in which the cultivator of these plants could never agree. The fronds are about two feet in height, sometimes more, and six inches in width, pro-

duced from a stout tufted caudex; the stipes and crown of the plant densely covered with largo scales, bipinnate, and somewhat lanceolate in shape; pinnæ broad at the base, and tapering to a point; the pinnules wedge-shaped at the base, and sessile, the basal one auriculate. A strong bold-growing Fern, easily cultivated, and widely distributed over the three countries.

P. aculeatum acrocladon.—This really handsome variety produces fronds between twelve and twenty inches in length. The greater portion of the frond is narrow, the short pinnæ being slightly crested, the upper portion many times furcate, becoming beautifully tasselled and curled, apex forming a dense multifid head four times the width of the lower portion of the frond. I believe this form was discovered in the West of England.

P. aculeatum lobatum.—Some authorities constitute this a species, others assert it is not distinct enough or sufficiently constant in character to be recorded as a variety, so much do the opinions of some of our leading authorities differ. I, however, accept it myself as a good distinct variety, for it has proved constant with me, neither have I seen it anywhere in cultivation assume the form of *P. aculeatum*. The fronds are from twelve to eighteen inches long, linear-lanceolate in shape, and sub-bipinnate; the basal pinnule larger and auriculate, or lobed. A widely distributed and handsome variety.

P. angulare (Soft Prickly Shield Fern).—A tolerably plentiful and very ornamental species, producing a quantity of variations of form, some of which are exquisitely beautiful. The fronds in the normal state bipinnate, and lanceolate in shape; pinnules auriculate and stipitate; the margins serrate and mucronate, from one to three, or

more, feet high, and from six to eight inches in width in the middle, dark green in colour, and produced from a stout tufted rhizome, which, together with the stipes and rachis, is densely scaly. It is rather scarce in Scotland.

P. angulare alatum.—This form has ovate-lanceolate fronds, from ten to twenty inches in height, and about six in breadth; the pinnæ are winged, through the pinnules not being divided quite to the base. A very distinct and handsome variety.

P. angulare corymbiferum.—This produces fronds some fifteen inches high, bipinnate; pinnæ furcate at the apex; the pinnules small, auriculate, and spiny, being armed with sharp short spines; the apex of the frond is terminated with a corymbose head. It is a pretty and distinct form.

P. angulare cristatum.—Fronds from one to two or three feet in height, the apex of the fronds and every pinnæ being beautifully crested and curled. This desirable plant should find a place in every collection.

P. angulare cristulatum.—A fine variety, originally found in Yorkshire. The fronds are upwards of thirty inches in length, and about ten in breadth, bipinnate; pinnules obtuse, auriculate, and sharply dentate; the apex of the frond is beautifully crested, as are many of the pinnæ. A desirable form in a collection.

P. angulare curtum.—This is a very distinct and handsome variety. The fronds are from ten to eighteen inches in height, and about six in width, tripinnate at the base and rich dark green in colour.

P. angulare dissimile.—This, though somewhat variable with me, is a very distinct plant, producing fronds from twelve to eighteen inches long, and between four and five broad, some of the pinnæ often much shorter than others,

and the pinnules are also very variable in size. The whole plant is densely clothed with scales. It was first discovered in Kent.

P. angulare gracile.—A most desirable plant. The fronds are spreading, bipinnate; pinnæ rather distant; the pinnules small and spiny. The base of the stipes very scaly. A very graceful and handsome variety.

P. angulare grandiceps.—Certainly the finest crested form of this species, producing fronds about twenty inches or two feet in length, and two inches in width; the pinnæ are all crested at the ends, the apex of the frond surmounted with a dense corymbiferous head, some four inches across. It is a plant no collection should be without.

P. angulare grandidens.—Fronds eighteen inches in length, and nearly three in width, often terminating abruptly, bipinnate; pinnæ and pinnules very variable; the pinnules very spiny, colour a dark and distinct green. This very curious form was first found in Devonshire.

P. angulare grandidens minus.—This is a little gem for the Wardian Case; the fronds seldom exceed six or eight inches in height, and are an exact miniature copy of the preceding.

P. angulare Holeanæ.—Fronds between two and three feet in length and eight in breadth, bipinnate; the pinnæ are dense, causing the pinnules to cross each other, giving the whole plant a very leafy appearance; stipes and rachis densely clothed with chaffy scales. A very handsome form of this variable plant. Originally found in Devonshire.

P. angulare Kitsoniæ.—This most beautiful variety is very distinct; it produces fronds from twelve to twenty inches long, bipinnate, rather narrow towards the apex;

the frond divides, to become again and again fureate, forming a dense eorymbose head, beautifully curled; pinnae small and erenate on the margins; stipes densely clothed with chaffy scales. No Fernery or Wardian Case should be without this handsome plant. I am not aware that it has been found anywhere but in Devonshire.

P. angulare latipes.—A fine strong-growing handsome plant, producing fronds from thirty to forty inches in height, and nine in width, lanceolate in shape, bipinnate; pinnules deeply lobed and spiny, the basal pinnule on the upper side of the pinnae very much elongated; stipes densely clothed with large light brown chaffy scales. Discovered in Somersetshire.

P. angulare parvissimum.—This really elegant plant should be in every collection, and is well suited for a Wardian Case; the fronds seldom exceed twelve inches in length, tapering sharply to a point; the pinnae are numerous, and the pinnules are very minute, obtuse, and imbricated, somewhat coriaceous in texture, and dark green in colour.

P. angulare plumosum.—An elegant variety which deserves to be in every collection; it produces fronds between two and three feet in length, and about eight inches in breadth, bipinnate, and broadly lanceolate in shape, with beautifully and finely cut pinnules, rather thin in texture, and bright light green in colour. This form is found in several localities, but was originally discovered in Devonshire.

P. angulare polydactylum.—This makes a very pretty Fern for the Wardian Case. The fronds seldom exceed twelve inches in height, and are about three in breadth, dark green in colour, linear-lanceolate in shape, and

bipinnate, several times forked at the apex; the pinnæ are also forked in like manner. A distinct and rare form.

P. angulare proliferum.—An elegant variety, which, notwithstanding the numerous fresh forms that have appeared, still maintains its reputation as an elegant and graceful form. The fronds are from eighteen to twenty-four inches in length, and upwards of six in breadth, lanceolate and acuminate in shape, bipinnate; the pinnules are acutely lobed, each lobe being somewhat mucronate. It produces small bulbils at the base of the fronds; stipes scaly.

P. angulare proliferum Crawfordianum.—This very handsome variety produces fronds about twenty inches high, broadly lanceolate in shape, bipinnate, the pinnæ blunt, and the pinnules auriculate and thick in texture. It should be in every hardy Fernery. Found near Belfast.

P. angulare proliferum Wollastonii.—Fronds three feet in length, and eight or nine inches wide, linear-acuminate, and tripinnate, producing bulbils at the base; the pinnules are finely and elegantly divided, and altogether it is one of the handsomest of the numerous forms of this species.

P. angulare pterophorum.—A somewhat rare plant, and at the same time very handsome and distinct. The fronds are about twenty inches high, and four wide, ovate-lanceolate in shape, and dark green in colour, pinnate, the pinnules pinnatifid and large. This beautiful form was originally found in Devonshire.

P. angulare rotundatum.—The fronds of this variety are from twelve to eighteen inches long, and about three and a half broad, lanceolate and acuminate at the

apex, bipinnate; pinnules obtusely rounded and erenate on the margins, deep green in colour. A handsome, distinct, and rare form; it should be in every collection or Fern Case. Found in Somersetshire.

P. Lonchitis (Holly Fern).—This handsome species is found principally in the highlands of Scotland, less profusely in Wales and Ireland, and only in a few spots in the north of England; the fronds are very stiff and rigid, pinnate, pinnæ entire, about an inch in length, beared at the base, and dentate on the margins. A beautiful erect evergreen plant, which should be in every Fernery and Wardian Case.

PTERIS.

The only species in this genus; is too well known to need comment. It will grow in any soil, except a chalky one, and when growing luxuriantly and sheltered it is a noble plant. Many variations of it have been found, and some few named, but they have proved far from constant in cultivation.

P. aquilina (Common Braeken).—This, though the most common of our indigenous species, when seen in a sheltered spot, and in good soil, is one of the most handsome. The fronds are produced from a stout fleshy underground creeping rhizome, and vary from six inches to ten feet in height, bi and sometimes tripinnate, triangular in form, the pinnæ oblong and opposite, pinnules sessile, entire or deeply lobed, dark green in colour, and downy on the under side; sori marginal. It is generally distributed in the United Kingdom. There is a crested variety, a furcate form, and a ramose state of this plant recorded, and I have also received specimens of a variegated variety from Yorkshire.

SCOLOPENDRIUM.

This truly protean species has produced some of the most extraordinary and beautiful forms it is possible to imagine; and to it we are indebted for a great deal of the beauty of our out-door Ferneries. Although but one species is indigenous, we have from that one nearly five hundred named and described varieties, some of which, though too small to be effective in the hardy Fernery, present a beautiful appearance in the temperate house or Wardian Case. The soil best suited for the culture of the robust-growing varieties is a mixture of loam and sand, with the addition of a little limestone broken small. For the more delicate, a little fibrous peat may be added with advantage; let the drainage be perfect, and supply them with abundance of water during the growing season. Many of them have a fine effect when planted on the banks of a stream of water in the Fernery, and this position they seem to enjoy, as they make fine fronds, especially the drooping kinds.

S. vulgare (Common Hart's Tongue Fern).—A very variable species, both in form and size, producing fronds from a few inches to several feet in length; in the normal shape of the plant the fronds are ligulate, entire at the margins, and cordate at the base; dark green in colour, with very bold lines of dark brown; sori on the under side, the stipes slightly scaly at the base.

S. vulgare abruptum.—This form seldom has the rachis produced quite to the apex of the fronds, which are from four to twelve inches long, and about two wide; base cordate, apex blunt, almost round, erect in habit, and very distinct.

S. vulgare albescens.—A most singular dwarf form, pro-

dueing narrow fronds, rich dark green below, and nearly white on the upper surface. This distinct plant is a charming subject for a Fern Case.

S. vulgare bimarginatum.—This very pretty variety grows about nine inches high when strong, and upwards of half an inch in width, the margins very much fringed or lacinate. It is well adapted for a Wardian Case.

S. vulgare bimarginato multifidum.—A beautiful and singular form of the preceding. The fronds are about nine or ten inches long, and half an inch wide, very much fringed on the margin and there fertile, the apex terminating in a much branched crest or multifid head, upwards of three inches across; like the preceding, it is a fine ornament to the Fern Shade.

S. vulgare cervi cornu.—This little gem should be in every Fernery or Fern Case. It produces fronds seven or eight inches high, and about half an inch wide, erect, and branching about three inches from the top, each branch becoming several times furcate, forming a short branching head from three to five inches in width; the margins of the frond finely and profusely dentate, and a portion of the under surface next the margin much corrugated. A very distinct and desirable variety.

S. vulgare Claphamii.—A singular form, with fronds about two inches wide and twelve long, the margins of which are deeply and irregularly lobed or lacinate, and curled; the apex furcate, and crested. It is very suitable for a Wardian Case as well as the Fernery.

S. vulgare columnare.—This species has produced an extraordinary number of gems for the Wardian Case, and this variety is certainly one of the prettiest. The fronds are about six inches high, the apex branched and forming a neat little multifid head; the remaining por-

tion of the frond is only like a wing to the rachis, and beautifully crenate on the margins. A charming rare variety.

S. vulgare constellatum.—A lovely little variation of this protean species. A short distance from the base the stem is branched, each becoming again furcate, and the whole forming a dense crested head, beautifully curled, and broader than the plant is high. It should be in every Fern Case.

S. vulgare contractum.—This form is narrow-fronded, entire, and simple as in the normal state, but it becomes suddenly contracted near the apex, spreading into a densely curled multifid head, about three inches across, soriferous in the crenatures and upon the upper side. It seldom exceeds a foot in length, and is very ornamental as a Wardian Case plant. I believe it was originally found in Ireland.

S. vulgare Coolingi.—A remarkably handsome form, of dwarf erect habit, making fronds from two to four inches high and nearly as broad; so much are the fronds branched, curled, and crested, that the whole frond and plant closely approximates to the form of a sphere. A most desirable and interesting sport.

S. vulgare cornutum.—From a very multifid form we come to a nearly simple-fronded one, with undulated margins, and an obtuse apex, producing a slender curved horn-like point. A curious and desirable plant, found in Yorkshire.

S. vulgare corrugato-fissum.—An admirable addition to either an in-door Fern Case or the open air Fernery. This variety produces erect fronds about eighteen inches in height, and one in breadth; the margins are deeply and irregularly lobed; the upper surface is striated and

corrugated, and marginate on the under side. A very curious and desirable plant.

S. vulgare corymbiferum.—Fronds six or eight inches high, a third of which is occupied by the multifid head, which differs from most in not being eurled; the margins and head are remarkably smooth. From its dwarf habit, it is suitable for any Fern Case.

S. vulgare crispum.—This form has been in our gardens for a long time, and is still one of the most handsome. The fronds are erect, from twelve to twenty inches long, upwards of two in width, and invariably barren; the basal lobes are larger than the normal state; the margins are erenate, and beautifully undulate, giving the whole the appearance of a deep frill. A most desirable variety, found in Wales, Yorkshire, and Guernsey.

S. vulgare crispum-fertile.—Similar to the preceding. The fronds, however, are lanceolate in shape, and acuminate at the apex, the undulations very uniform, and the sori profuse and bold. Originally found in Lancashire.

S. vulgare crispum-latum.—This is a very handsome variety. Fronds from ten to twenty inches long, and nearly four in breadth, beautifully eurled and frilled on the margins, and bright dark green in colour.

S. vulgare crispum minus.—A dwarf form of *crispum*, seldom exceeding ten or twelve inches in height, by nearly two in breadth; margins undulated and densely frilled. It is very suitable for the Fern Case. Discovered in Guernsey.

S. vulgare cristatum.—This is a pretty form, either for a Wardian Case or the open Fernery. It produces fronds from six to ten inches high, branched, and each becoming again divided, forming a large, broad, obtusely-lobed erect, some three or four inches in diameter.

S. vulgare cristatum minus.—Resembling the preceding, but only about four inches high, making a pretty little crested tuft in a Wardian Case.

S. vulgare digitatum.—A beautiful variety. It produces fronds from ten to fifteen inches high, often in pairs, and producing a dense, irregular, much-branched, and crested terminal head, which is curled, and frequently twelve inches across. It is very generally cultivated, and deserves to be in every collection.

S. vulgare Elworthii.—This is a little gem for the Fern Case. The fronds are from two to three inches high, and as much in width, somewhat flabellate in shape, and so deeply cut as to divide it into three lobes of the same shape; the margins are curled, undulately lobed in a less degree, or serrate. Very rare in cultivation.

S. vulgare fimbriatum.—A very pretty and interesting form, producing fronds of two kinds, broad and narrow. The former are from five to ten inches in height, and about three quarters of an inch in width; the latter about the same length, but seldom more than a quarter of an inch wide, and sometimes even less; the margins are beautifully undulated and frilled, and conspicuously dentate. It should be in every Fernery, and is a fine ornament in the Fern Case. Originally found in Guernsey.

S. vulgare fissile.—Another beautiful sport, and admirably adapted for the Glass Case. It produces fronds about ten inches high and one wide; the margins profusely and irregularly lobed, slightly increasing in width towards the apex; erect in habit, and constant in form.

S. vulgare fisso-lobatum.—This charming little variety is somewhat similar to *fissile*, but much narrower. The fronds are not undulate, but are deeply and unequally

dentate, contracted near the apex into a flask-shaped neck, which is terminated by a small curled crest.

S. vulgare flabellatum.—Fronds three to six inches, or perhaps a little more, in height. The basal portion of the frond is like the normal, but a little narrower, forked; the branches again divided, lobes broad, and overlapping each other, ending abruptly in a flat flabellate head, some four or five inches wide, and but slightly crested. A pretty variety, well suited for a Wardian Case. Rare in cultivation.

S. vulgare glomeratum.—A really handsome and distinct variation, with narrow fronds from three to six or eight inches high, dividing towards the apex, and forming a dense globular curled head some three inches in diameter. It is well adapted for a Fern Case. Found originally in Jersey.

S. vulgare Gloveri.—This is a very pretty dwarf variety, so densely branched that it is nearly as broad as long. The fronds are about six inches high, and resemble the preceding in the manner of branching, but the lobes are flatter, more obtuse, and not curled, but forming a broad multifid head. A beautiful form for the decoration of the Fern Case.

S. vulgare irregulare.—Fronds from six to twelve inches in length, unequally incised, and so deeply lobed as to become almost pinnatifid; margins undulate, apex often fureate. Found in Guernsey.

S. vulgare irregulare majus.—This is a gigantic form of the preceding. A very ornamental variety in the hardy Fernery.

S. vulgare irregulare minus.—A little gem for Wardian Case culture. The fronds are some three or four inches high, often in pairs, and fureate at the apex, unequal

in width, with irregular, slightly undulated, and curled margins.

S. vulgare laceratum.—This very handsome form is frequently found in collections under the name of *endivæfolium*. The fronds are a foot in length, sometimes more, though frequently less, and beautifully crested and curled at the apex, forming a multifid head four or five inches in width. It makes a handsome little specimen in the Wardian Case.

S. vulgare laciniatum.—A pretty form, growing from ten to fifteen inches long. Fronds narrow, fringed and deeply cut on the undulated margins; apex of frond almost normal. Very suitable for a Fern Case.

S. vulgare latifolium.—This is a large and curious variety. The fronds are obtuse at the apex, cordate at the base, more or less undulated on the margins, and elliptical in shape. Found in Devonshire.

S. vulgare lato-digitatum.—A very pretty plant for a Wardian Case; it grows from six to ten inches high, and about one and a half inches in width, the apex branching into a broad leafy digitate head; the margins dentate and slightly curled.

S. vulgare lato-multifidum.—The fronds of this variety are about the same size as the preceding, the apex much forked and contorted, forming a fine multifid crest, deeply lobed, and obtusely crenate on the margins. A pretty form. Found near Bristol.

S. vulgare limbospermum.—A very peculiar and desirable variety, producing fronds about nine or ten inches long and an inch in breadth, the base somewhat depauperate, from which it gradually tapers to the apex, where it is branched, each branch being furcate; the margins irregularly lobed and slightly dentate; the sori

are situated on the extreme edge, and sometimes partially on the upper surface of the fronds, leaving the under side barren.

S. vulgare lonchophorum.—This extremely handsome little variety is a distinct ornament to a Fern Case. The fronds are six or eight inches high, and narrow, for they seldom exceed half an inch in width, and trifid at the apex; the sori are very much crowded near to the margin. It was found in Lancashire, and deserves to be in every collection.

S. vulgare macrosorum.—A fine variety, rich dark green in colour, the fronds varying from ten to eighteen inches in height, and measuring about an inch in diameter; the margins sinuate, and the apex obtuse; the sori are large and conspicuous. Found originally in Guernsey.

S. vulgare Malcomsoniae.—This is an elegant Fern for a Wardian Case or the open Fernery. The fronds are from nine to twelve inches in length, forked about half way up, each branch again dividing, and forming a ramose tufted head some four inches in diameter; the margins are curled, and deeply and finely incised, giving the whole crest a very handsome appearance. It was found originally in Ireland.

S. vulgare marginato-coronatum.—In addition to all the characters of *S. marginatum*, this plant has the margins of the fronds obtusely lobed, the apex several times forked, and beautifully curled and pointed. A very handsome form, and one well adapted for Wardian Case cultivation.

S. vulgare marginato-multiceps.—A handsome form of *marginatum*. The fronds are about twelve inches long, and one wide, and producing at the apex a dense multifid crest or head, some three or four inches across, deeply

lobed and beautifully curled. It is admirably adapted for the Fern Case.

S. vulgare marginato pygmaeum.—This resembles the preceding, but is smaller in all its parts; it seldom exceeds two inches in height, often producing fronds like miniatures of the variety *cornutum*, in which the mid-rib is extended into a horn-like process. It is a perfect little gem for a Wardian Case.

S. vulgare marginato-triforme.—Fronds twelve inches in length, and from half an inch to an inch in width; margins of the frond deeply sinuose, the apex bifid or trifid. A handsome variety, found in Devonshire.

S. vulgare marginatum.—A form which has been found in many parts of the country, and a very desirable and handsome plant in a collection. The fronds vary from ten to twenty inches in height, and from half an inch to an inch in breadth, erect in habit, almost linear in shape, but not quite, as it becomes slightly wider at the apex; the margins beautifully undulate and fimbriate. On the under side is an excurrent marginal vein, sometimes growing out into a membrane, and extending almost to the apex, so that the margin is double, and both frond and membrane fertile.

S. vulgare multifidum.—This is a rather variable plant, but very handsome when in character, producing fronds about two feet long, and upwards of two inches wide; the apex of the frond branched, each branch being several times forked, the whole forming a dense multifid deeply-lobed crested head.

S. vulgare multifidum-nanum.—A charming little specimen for a Wardian Case, six to nine inches high, twin fronded; stipes naked up to the dense leafy multifid heads, which are beautifully undulated round the mar-

gins. This distinct and handsome form was first found in Devonshire.

S. vulgare omnilacerum.—Fronds twelve to eighteen inches high, narrow, erect in habit, and deeply lobed, almost sufficiently to call it pinnatifid; the lobes are furcate at the points, and fertile on the margins. A beautiful and desirable distinct variety, which deserves general cultivation.

S. vulgare palmatum-marginatum.—A truly elegant form, and one that will make a distinct and handsome specimen in a Fern Case. It seldom exceeds three inches in height; the apex obtuse, fronds broad at the base, and deeply and irregularly incised; the apex of the lobes sometimes furcate.

S. vulgare papillosum.—This is a curious variety. The fronds are from ten to fifteen inches in length, and about one in breadth; on the upper surface are numerous curious closely-set wart-like protuberances, which form a continuous medial line from base to apex. Found in the Channel Islands.

S. vulgare pinnatifidum.—An elegant and distinct form, growing about nine inches high, and little more than half an inch wide, deeply sinuose or pinnatifid, with wide open sinus. It is admirably suited for planting in the Wardian Case.

S. vulgare polycuspis-angustatum.—Fronds from six to twelve inches long, narrow, and unequal-sided, branching towards the top, and forming a denso ramose lacerated corymbiferous head. It is well suited for Wardian Cases.

S. vulgare polycuspis-undatum.—Another very pretty form, equally well suited for growing in Glass Cases. The fronds are eight or nine inches long, and about half an inch broad, branched close to the base, and forming

curled and pointed crests upon the apex; margins slightly undulate.

S. vulgare polydactylum.—The fronds of this plant are about six or eight inches long, and half an inch wide, ligulate in shape, the apex multifid, forming a narrow many-fingered head. Very pretty in a Fern Case.

S. vulgare ramo-marginatum.—This beautiful variety is about twelve inches high, twin-fronded, each branching, and then becoming ramose, and forming a splendid densely curled and crested multifid head. It is one of the most handsome of the many variations of this truly protean plant, and no collection or Wardian Case should be without it.

S. vulgare reniforme.—Fronds three or four inches long, and about one and a half broad, and kidney-shaped. It is a peculiar and interesting plant, though it is not always constant; it has been found in several parts of the country, and is well suited for the Fern Case.

S. vulgare rotundifolium.—This is another singular and distinct plant. The fronds resemble in shape the *Trichomanes* or *Adiantum reniforme*; they are about two or three inches high. A little gem for the Wardian Case.

S. vulgare scalpturato-latum.—A very pretty form, presenting the appearance of being beautifully carved upon the upper surface. The fronds bifid, sometimes trifid at the apex; the margins undulated, about eighteen inches in length, and between one and two in breadth.

S. vulgare spirale.—The fronds of this variety seldom exceed six inches in length, and one inch in width. They have the margins curled and undulated, towards the apex becoming twisted and spiral, hence the name. A charming little plant in a Fern Case, found in several parts of the country.

S. vulgare Stansfieldii.—Amongst the numerous beautiful forms assumed by the Hart's Tongue Fern, this is one of the very finest and most distinct. The fronds are from six to twelve inches long, and between one and two inches wide; the margins deeply lobed and undulated, the lobes finely lacinated and curled, which in some instances look almost like little crests. It is a beautiful addition to any collection, and is also well adapted for the Wardian Case.

S. vulgare undulatum.—Similar in appearance to *S. crispum*, though the margins are not curled as in that form, but simply undulated. It is not so wide, and differs also in being fertile; length of frond six to twelve inches. A very suitable and pretty plant for a Fern Case. Found in Devonshire, Hampshire, Derbyshire, &c.

S. vulgare variegatum.—A dwarf variety, producing fronds variously striped with white, some forms of this plant being more or less yellow instead of white. It is a pretty and distinct plant for the Glass Case.

S. vulgare Wardii.—The last variety in this list, but not the least; it is a charming little plant for the Wardian Case. The fronds are from two to four inches long, or more, often dividing near the base, each division bearing a small leafy multifid head, irregularly lobed, and often beautifully curled, being also profusely covered with little bulbils, which ultimately form young plants.

TRICHOMANES.

For the culture of this beautiful genus, see the instructions given for the management of temperate Filmy Ferns (page 19). In a Wardian Case, either in the dwelling-house or Fernery, the Killarney Fern is one of the

most elegant plants in cultivation. It is widely distributed over the globe, but is rare as a British species. One or two more varieties are recorded by some, any of which are worthy general cultivation.

T. radicans (Bristle Fern).—This species has been briefly alluded to in the exotic list, because, though a native of Britain, it is widely distributed over tropical America, &c., and will thrive well in the stove. The fronds are from ten to eighteen inches long, tripinnatifid, and broadly ovate in shape; the pinnae slightly toothed or bristly, which has given rise to the common name. They are rich dark green in colour, and remain in perfection for several years; it succeeds well in a Wardian Case, either in the Fernery or dwelling-house, and is one of the most charming Ferns in cultivation. Formerly it existed in various parts of England, but I am not aware of a single locality at the present time. It has been recently found in Wales, and is more particularly known as inhabiting many parts about Killarney in Ireland, which has given rise to the name of the Killarney Fern.

T. radicans Andrewsii.—A handsome and distinct form of the preceding, differing in having narrow lanceolate fronds, the pinnae being more distant, narrower, and erect; the naked stipes much longer, and the involucres are immersed in the frond. It succeeds well grown in a Glass Case, and is thoroughly distinct. Found in Ireland.

WOODSIA.

The plants comprising this genus are deciduous, and generally considered difficult to cultivate; but if a little care is bestowed upon them they will make charming

little specimens. The first thing to be attended to is drainage; if grown in pots two-thirds of the depth must be filled with drainage material, and the soil should be good fibrous peat and silver sand, with the addition of some small pieces of sandstone, and a very small portion of loam. The plants should be kept in a northern aspect, protected from the sunshine, and should have a liberal supply of water during the growing season. No varieties of this genus are recorded.

W. alpina (Alpine Woodsia).—A pretty little plant, but one that succeeds best with a little protection. The fronds are light bright green in colour, four or five inches in length on good examples, pinnate; pinnæ alternate, sessile, pinnatifid, and somewhat triangular in shape, obtusely lobed and hirsute; stipes jointed and slightly scaly. It is found on the Scotch and Welsh mountains, and is sometimes called *W. hyperborea*.

W. ilvensis (Oblong Woodsia).—Is a rather stronger-growing plant than the preceding species, the fronds rising to the height of six inches, oblong-lanceolate in form, pinnate, and scaly; pinnæ obtuse, oblong, and deeply pinnatifid. It is found in various parts of Scotland and the North of England. I have received very fine specimens of this species from Lapland and Sweden.

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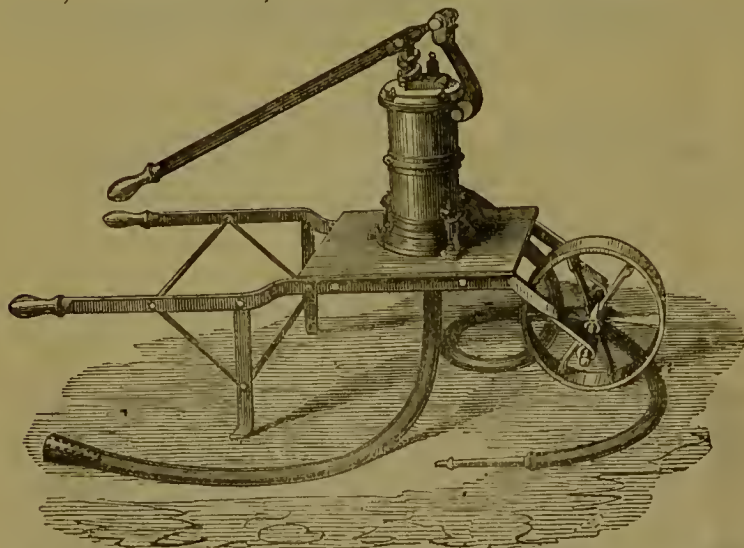
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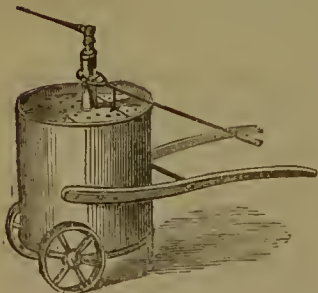


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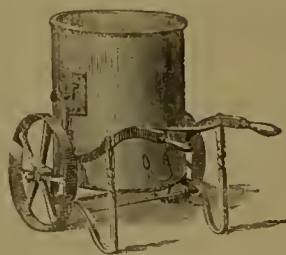
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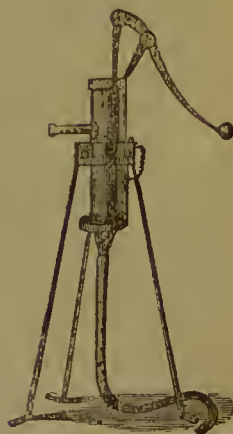
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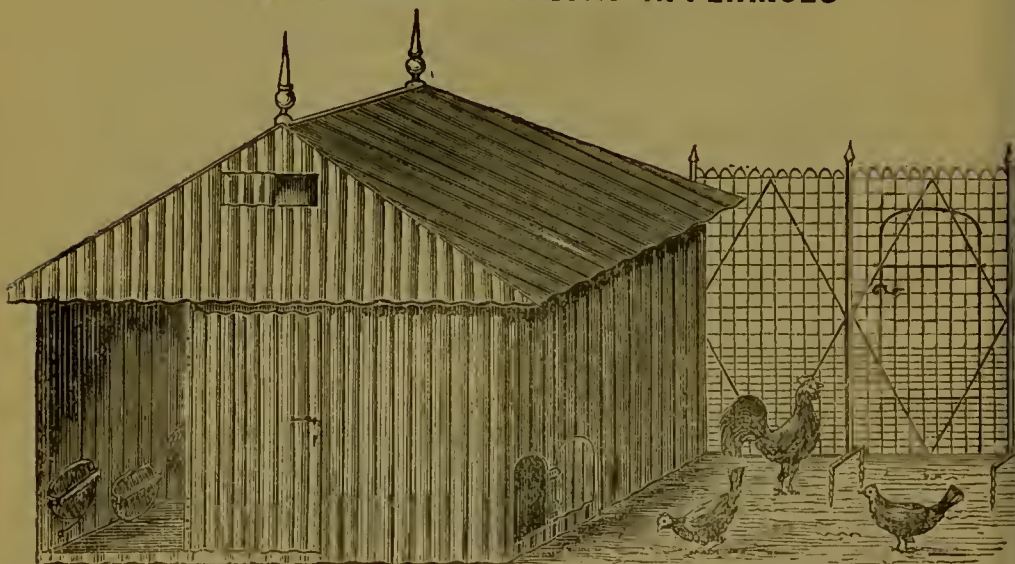
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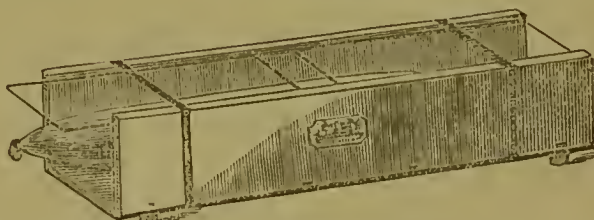
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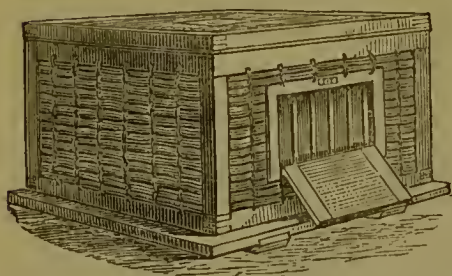
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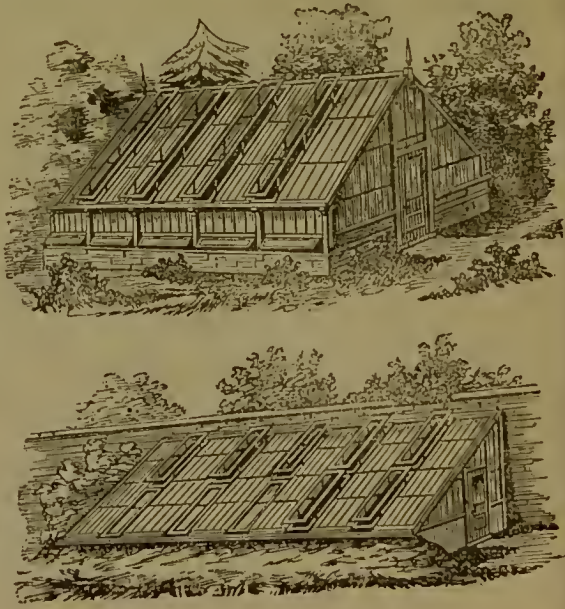
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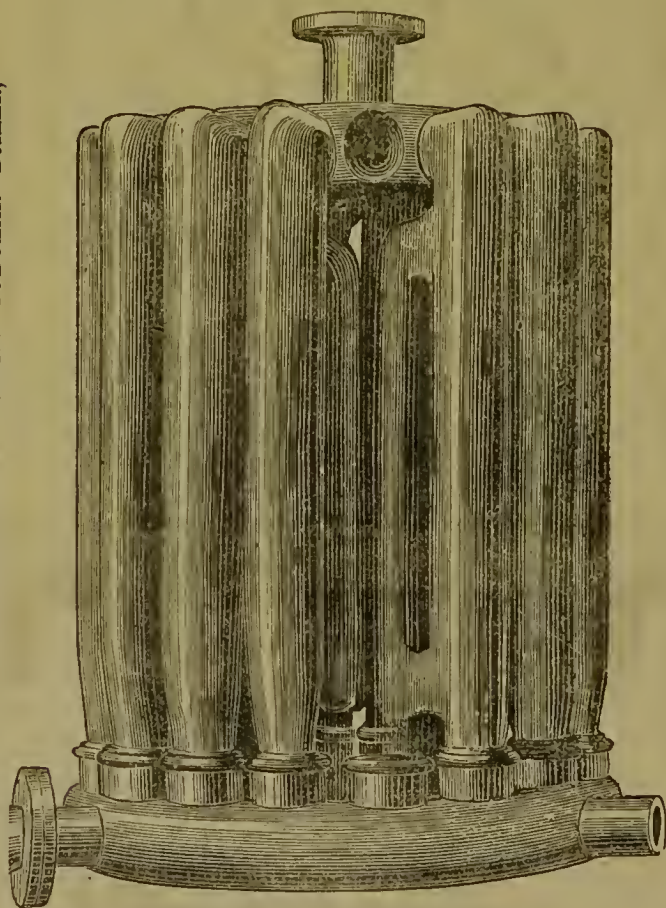
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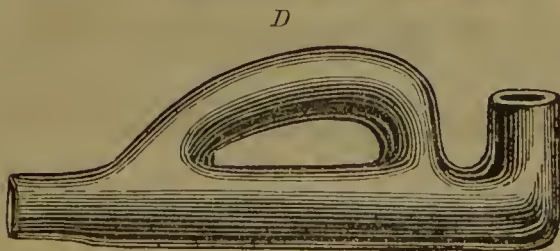
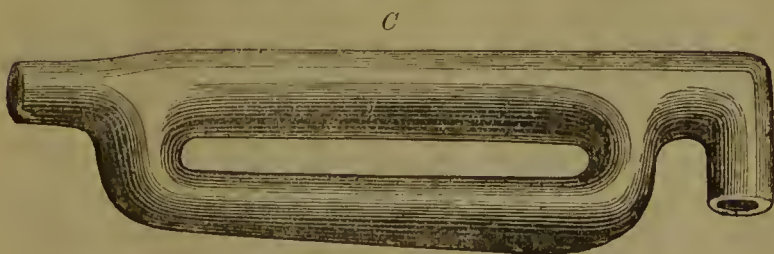
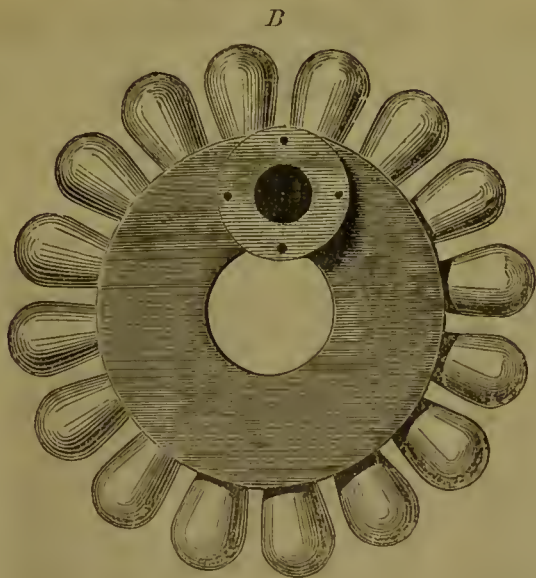
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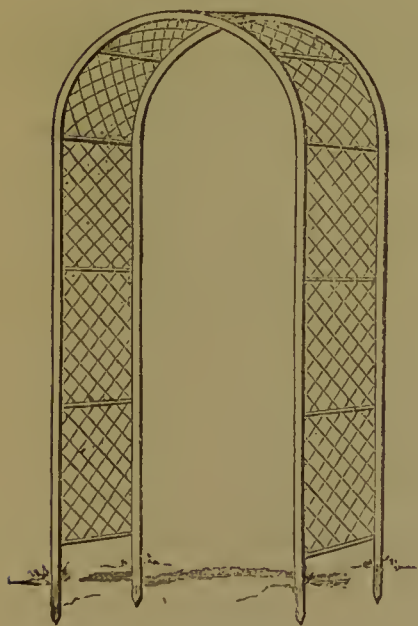
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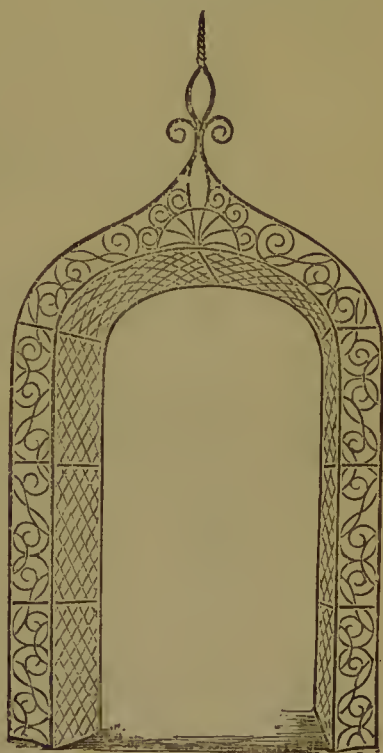
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No. 51.

A cheap and useful article, much used.

| Height out<br>of ground. | Span. | Width.    | Painted<br>Green. | Galvanised. |
|--------------------------|-------|-----------|-------------------|-------------|
| 7ft.                     | 4ft.  | 1ft.      | 10/6              | 12/6        |
| do.                      | do.   | 1ft. 6in. | 14/0              | 17/6        |
| do.                      | do.   | 2ft.      | 18/0              | 23/0        |



No. 54.

| Height out<br>of ground. | Span.     | Painted<br>Green. | Galvanised. |
|--------------------------|-----------|-------------------|-------------|
| 7ft.                     | 4ft.      | 40/0              | 45/0        |
| 7ft. 6in.                | 4ft. 6in. | 45/0              | 50/0        |
| 8ft.                     | 5ft.      | 50/0              | 55/0        |

Inside  
measure

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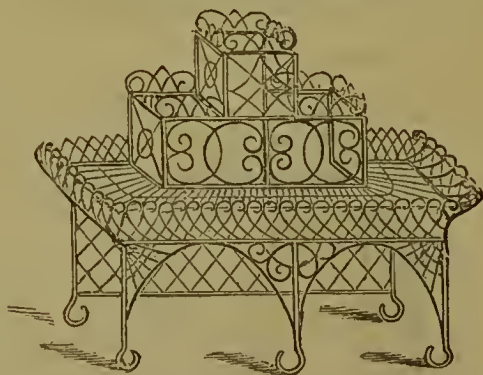
## SUSPENDING FLOWER BASKETS.



No. 119a.

| Size outside the top of basket. | Galvanised or Japanned any colour. |
|---------------------------------|------------------------------------|
| 0ft. 10in.                      | 3/6 each                           |
| 1ft. 0in.                       | 5/0 „                              |
| 1ft. 3in.                       | 6/6 „                              |
| 1ft. 6in.                       | 9/6 „                              |
| 1ft. 9in.                       | 14/6 „                             |
| 2ft. 0in.                       | 21/0 „                             |

## FLOWER STANDS.



No. 10.

Elliptic Recess Stand, with steps, will hold from 9 to 13 pots. Very suitable for the drawing room.

| Width.    | Height.   | Japanned green. | Japanned green and white. |
|-----------|-----------|-----------------|---------------------------|
| 3ft. 6in. | 3ft. 0in. | 21/0            | 24/0 each                 |
| 4ft. 0in. | 3ft. 6in. | 25/0            | 30/0 „                    |

Zinc Pans japanned to match, to prevent the drainage from the pots running on the carpet or floor; can be fitted to the above if desired.

|                  |            |
|------------------|------------|
| 3ft. 6in. stand, | 10/0 extra |
| 4ft. 0in. „      | 12/6 „     |

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PRICES—PER LINEAL YARD, 24 INCHES WIDE.

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		s. d.	s. d.	s. d.	s. d.
2½ inch	Dogs or Poultry	0 3½	0 4½	0 5½	0 6½
2 inch	Poultry	0 3½	0 4½	0 5½	0 7
1½ inch	Small Rabbits, Hares, &c.	0 4½	0 5½	0 6½	0 8
1½ inch	Smallest Rabbits	0 5½	0 6½	0 8	0 10
1 inch	Pheasantries, Small Birds, &c.	0 10	1 0½	1 4	1 10
¾ inch	Aviaries, Window Guards, &c.	1 1½	1 4	1 7	...
¾ inch	Aviaries, Window Guards, &c.	1 10	2 0	2 3	2 6

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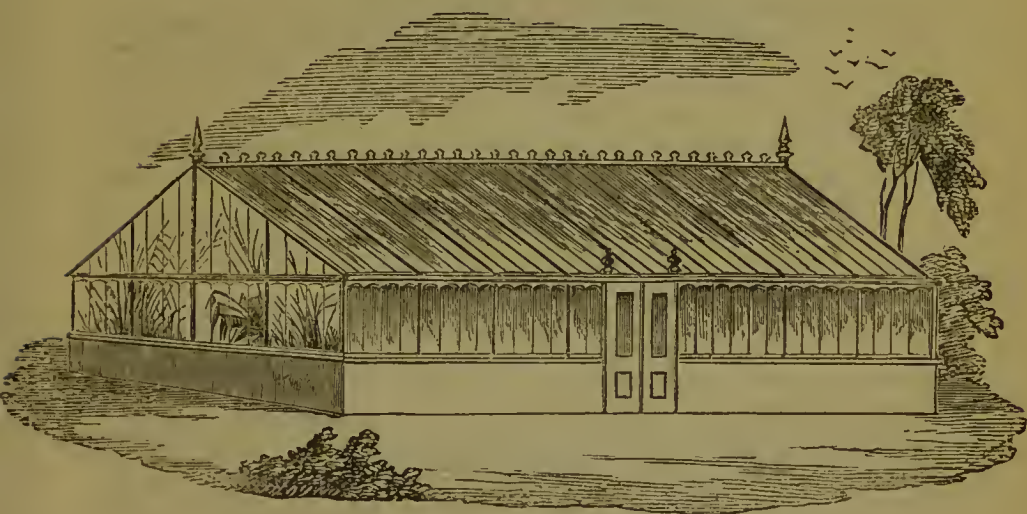
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